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Crime
Watch

Concern for Worker Must Govern Automation

By Anthony W. Connoles
Special to Computerworld

Contrary to what some think, most workers and their unions welcome increased automation and advancing technology in their jobs. They understand that increased productivity and lower unit costs create more wealth to be shared by workers, consumers and stockholders.

Generally, in fact, an understanding that an employer may introduce technical improvements into the work place is one of the trade-offs built into wage settlements within the manufacturing industry.

The United Auto Workers (UAW) and many other unions, for example, have clearly endorsed automation in their contracts. But the general ap-

proval of his employees doesn't free an employer from the responsibility to consider the impact of timing and other factors on his work force when he innovates.

Computer-aided technology is clearly covered by these union policies. But

Labor View

there is no doubt that computerized design and manufacturing functions magnify the problems that normally go with the introduction of new technology.

Too often, manufacturing management dismisses the problem with the cliché that automation produces more

jobs in the end. This attitude attempts to sidestep the fact that displacing labor is the prime motivation behind the introduction of automation and technology.

It also ignores the fact that each worker reacts not to eventual aggregate effects, but subjectively to its personal effects.

If employers offer workers only a choice between unemployment with technology, or full employment without technology, workers are forced to opt for economic survival.

Employment With Technology

The key, then, is to maintain full employment while reaping the full advantages of technology. This is im-

(Continued on Page 4)

CW Special Report: Computers in Manufacturing Follows Page 28

Data Shows No Net Harm

FCC Files Refute Bell Interconnect Claims

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. — Despite continuing AT&T claims that interconnection will harm the telephone network, the Federal Communications Commission (FCC) has no data to support such a position. A *Computerworld* study of FCC files which include correspondence from non-Bell vendors and users shows there are virtually no incidences where harm to telephone company facilities has occurred after the interconnection of noncarrier equipment.

The FCC files, which date back to early 1970 when interconnection tariffs came into effect, show few letters concerned with technical harm of any kind. Many of the letters deal with the practices of Bell operating companies in providing service to customers with noncarrier equipment.

In a letter to the commission staff from Telecommunications Systems of America, the company said "very few Bell repairmen are familiar with interface devices and are not trained in isolating troubles between customer-owned equipment and Bell equipment."

The letter dated January 1974, said the company had installed 20 systems and found only three Bell repairmen who "had ever seen an interface."

In a letter dated June 1973, the Federal Home Loan Bank of Des Moines wrote to the commission that from January to May, out of 165 problems encountered on 16 full-duplex multidropped data lines, 65% of the troubles were traced to

telephone company equipment while 11.4% was caused by customer equipment. We are "not aware of a single instance where customer-provided equipment actually did any harm or gave interference to the phone network," the letter said.

Back in June 1972, an official of Western Union Data Services wrote the com-

(Continued on Page 2)

Burroughs 4790, Front End Adopt Bipolar Memory

By Vic Farmer
Of the CW Staff

DETROIT — A new high end member of the Burroughs B4700 Series of mainframes and microprogrammable front-end minicomputer for the B2700, B3700 and B4700 Series employ bipolar semiconductor main memory for the first time in the Burroughs line.

The B4790 CPU is said to provide two to four times the performance of the current B4700 Series. Specifically, Burroughs claims the B4790 CPU has twice the main memory speed (250 nsec/two bytes), twice the main memory capacity per processor (1M byte), twice the CPU speed (8 MHz/sec) and twice the number of I/O channels per processor (40) to effectively double the I/O transfer rate.

The firm has also increased addressing efficiency to help the new CPU handle the larger memory sizes. The Master Control Program (MCP), now expanded to handle the larger memory and I/O capacity, is designated MCP-VI, but it can also be used with the smaller B2700s through B4700s.

Workflow, Security Control

In addition, modifications in the MCP-VI provide a new workflow management and security system.

The workflow management system is said to simplify controlling and scheduling a computer's resources and workload. The security system, in effect, provides the user more expanded facilities for control and regulation of accessibility to files, to data within files and to the system itself through levels of password techniques, Burroughs said.

A new file and program attribute gives operational staff the ability to change a

(Continued on Page 4)

Sharp Price, Service Increases Planned for IBM, Univac Users

By E. Drake Lundell Jr.
Of the CW Staff

Most users of IBM and Univac equipment in the U.S. will be slapped with higher lease and maintenance charges by the first of the year.

The IBM price increases, which apply to nearly the entire 370 CPU line and most new peripheral equipment, range from 6% to 8%, the firm said last week.

The Univac increases average 6%, Univac said, and cover "the most widely used" equipment.

IBM purchase price increases take effect immediately; lease and maintenance prices go up on Jan. 1.

The Univac price increases, which cover purchase, lease and maintenance, are ef-

fective Sept. 30 and cover the 1100 line and the Series 90 systems.

Prices will remain unchanged on such items as the IBM 360 Series, the 1130, the 1800 and the 370/155 and 370/165 CPUs. Products announced recently such as the 3767 and 3730 terminal series will not be affected.

All IBM maintenance and other service charges will be increased by 8%, including system engineering services, due to "the increasing cost of doing business," IBM said.

In the move, IBM raised the lease price of the System/7, 370/115 and 370/125 CPUs by 6%, although the purchase price remains unchanged.

(Continued on Page 4)

Network Nabs Card-Carrying Kidnapper

By Tom Geyer
Of the CW Staff

TOKYO — The central computer in a large on-line bank network based here turned from dupe to detective recently and helped nab an ingenious kidnapper.

The accused kidnapper, Masatoshi Tashiro, planned to use the automated network recently installed by the Dai-Ichi Kangyo Bank to solve the perennial kidnapper's dilemma: how to collect the ransom without getting caught.

According to computer crime expert Donald Parker, a senior information analyst at Stanford Research Institute, Tashiro decided to open a cash card account at the bank under an assumed name and demand the ransom money be deposited there.

Then, cash card in hand, he could pay random visits to the bank's 328 remote cash dispensing terminals and withdraw the money \$1,200 at a time, the limit available from a single autoteller transaction.

The key to Tashiro's scheme was his discovery — apparently with inside help — that update information on transactions at the remote tellers took 10 to 15 minutes to reach the bank's central on-line files. By the time one of his withdrawals could be detected, he figured, he could be far away, Parker explained.

Having made a few trial runs with his own money, Tashiro allegedly kidnapped actress Yukiji Asaoka, daughter of a famous Japanese painter, and demanded that her ransom be deposited in his cash card account.

But Tashiro failed to reckon with the resourcefulness of the bank's programmers and the Tokyo police. The programming staff quickly devised a "patch" for the on-line software that immediately printed out a warning and the location of

(Continued on Page 4)

On the Inside This Week

Data Bank Triad Seen
As Subjects' Protection

—Page 6

SDLC Acknowledged
As Industry Standard

—Page 39

Communications	29
Computer Industry	39
Editorial	10
Financial	54
Software/Services	13
Systems/Peripherals	21



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But Panelists Differ on Extent of Problems

EFTS Faces Myriad of Social, Legal Issues

By E. Drake Lundell Jr.

Of the CW Staff

NEW YORK — Although the technology is well in hand, serious social, policy, legal and consumer acceptance problems may affect the future development of electronic funds transfer systems (EFTS), panelists at the recent Info '74 agreed. But there was argument over the particular effects of those problems.

The consumer is presently a bystander in the development of such systems, Philip Brooke, operations/technology editor for *American Banker*, said, noting the "quality and type of service he will need in the future is not understood."

But Dr. William Ford, executive director of the American Bankers Association, indicated the greatest advantage to the consumer would be convenience, permitting him to have greater control over when, where and how he conducts financial transactions.

Although he admitted there was widespread skepticism over the potential for such services among consumers, Ford said EFTS systems that allow the consumer to conduct his banking 24 hours a day in such convenient locations as supermarkets and retail stores would be welcomed by consumers if the systems were marketed better.

Robert H. Grant, president of R.H. Grant Associates, noted that while recent surveys of consumer attitudes show a generally negative attitude toward EFTS overall, card-related services such as point-of-sale (POS) and cash dispenser systems have wider public acceptance than direct deposit and bill paying services.

More Than Sales Problem

But while the question of consumer acceptance may be the most troublesome for the future, there are other serious problems to be faced, the panel agreed.

Public policy issues on competition and regulation in the banking industry will have to be taken into account, Brooke said, adding that legislators and others will want to make sure EFTS technology is not used to close some institutions out of the financial services market.

He noted there are presently two bills in Congress that would set up commissions to study the whole area of EFTS, and one of their prime concerns would be competition and the interrelationship between banks, savings institutions and merchants in running EFTS networks.

New laws are definitely possible in the

area, Grant agreed, adding that there might even be antitrust problems with some of the shared system arrangements between banks in local areas.

The twin problems of security and consumer privacy in such systems will also be important, the panelists agreed, indicating that legislation may also play an important role in this area.

Grant said few bankers realize the serious consequences to personal privacy inherent in a financially wired nation.

Even beyond the present and possible legal restrictions on systems developed to protect privacy, Ford said there is also a moral responsibility on the part of the

banks to insure that such records remain private.

On the other side, there is the question of embezzlement and theft of funds from such systems, Ford indicated.

While in the past thieves came armed with machine guns, the Bonnie and Clydes of the future may be armed only with software, he said.

While the panelists differed somewhat on the effect of all these problem areas, they did agree with Brooke that top management of banking would have to become "vigorously and purposefully" engaged in their solution.

Thrift Institutions 'Threatened'
By Clearinghouse Legislation

By Edith Holmes

Of the CW Staff

NEW YORK — Current legislation establishing automated clearinghouses relegates the thrift industry to the status of a group of second-class financial institutions, John W. Petrusky, senior vice-president with Dry Dock Savings Bank here, told an audience concerned with the practical goals of electronic funds transfer systems (EFTS) at Info '74.

"Savings banks and savings and loan companies have been left out of the planning for EFTS," he said. "If we are to participate in EFTS, we must shift the concern of our industry from funds placement to funds acquisition."

Petrusky noted that at present, 90% to 95% of all thrift institutions operate with on-line systems. But, he added, "too much of that percentage includes outmoded systems."

And, Petrusky contended, legislatively, thrift organizations have been assigned "a second-class status in the development and operation of electronic funds transfer."

He explained that Social Security payments, for example, currently move from the Federal Government through the Treasury Department to the individual, who either deposits his check in a credit bank or in a thrift institution. "In either case, the individual chooses which financial route to take," he said.

But with the government's new emphasis on direct deposits, Petrusky indicated payments will soon pass from the Social

Security Administration through the Treasury to the Federal Reserve Bank and automated clearinghouses. From there, funds will move directly into the credit banks, which may then pass them on to savings and savings and loan organizations, he noted.

Thrift institutions will also occupy the bottom rung of the financial ladder in EFTS with respect to the deposit of paychecks, according to Petrusky.

An individual paid by his company now deposits this money in either a savings or a commercial bank. If deposited in a credit bank, the funds are then transferred through a clearinghouse to the Federal Reserve Bank, and, from the Reserve Bank, through a credit bank and back to the company.

Petrusky argued the competitive position of thrift organizations will soon be severely eroded when the government redirects the flow of funds from a company through a credit bank to the Federal Reserve Bank and automated clearinghouses. Money will then be transferred to credit banks and finally to savings banks, he said.

He asserted thrift institutions can compete with commercial banks in funds transfer.

"We contend that through our 'now' or demand withdrawal accounts, accessible through financial ID cards, we can satisfy the needs of present and potential customers, while competing with commercial banks," Petrusky said.

FCC Files Refute Bell Interconnection Claims

(Continued from Page 1)

mission staff that "we have no knowledge of any common carrier plant facilities being damaged due to customer-owned equipment being tied to their lines." In another section of the submission, the official said there actually were degraded levels of service that could be traced directly to the installation of AT&T data access arrangements (DAA).

"It takes one to three seconds longer to originate a call behind a Bell DAA than it takes without a DAA," he said for example.

Bell 'Threats'

In a letter to the Senate antitrust subcommittee, another communications firm listed the practice of Illinois Bell Telephone in making "verification" calls to a customer who intended to switch to non-Bell equipment.

Written in December 1973, the letter detailed how the customer was threatened by Bell representatives with statements like, "We will rip out the wiring and leave holes and markings on the walls and ceilings and your line charges will increase."

The only data received by the commis-

sion staff with alleged instances of harm have come from the Bell System. Industry sources have said that much of the Bell information is questionable.

The FCC's interconnection office is now compiling the submitted data, and a common complaint among the staff is that relatively few affected users have taken the time to document their interconnection experiences for the staff.

One staff official stressed the importance of users writing in. For its own reasons, the staff would like to have these facts to compare with the claims made by the carriers.

SPN Codes Still Alive and Well

WASHINGTON, D.C. — The Pentagon may have made a hollow pledge to veterans when it agreed to discontinue using Separation Program Numbers (SPN codes) on discharge papers.

The policy will apply only to new veterans, and the Pentagon has announced it will not replace previously issued coded forms unless a veteran discharged before the new policy became effective requests the new uncoded forms.

The staff official cautioned users that the most effective letters are those that can cite specific instances and are accompanied with statistics to prove the writer's point.

One of the most damaging reports against harm came last May from the National Association of Regulatory Commissioners which formed a study group to look into the interconnection question. "The committee is unable to draw any firm conclusions as to whether the overall quality of telephone service has been significantly affected," the report concluded.

Furthermore, an "internal coding system" will be maintained.

The SPN codes, which came under scrutiny in a recent TV special aired by ABC-TV, represent secret — and often — negative opinions of certain commanding officers.

Even servicemen with honorable discharges were assigned negative SPN codes that were hurting them in their search for employment, investigators claimed.

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While executing your program against the test files generated by TDG, you can execute the MetaCOBOL Run-Time Debugging Aid (RDA), which also uses simple directives embedded in the source code. The RDA produces an Unexecuted Paragraph Summary, which will VERIFY the completeness of your testing.

Apart from its usefulness in verifying testing completeness, the RDA is also a powerful tool in the Verification phase for auditing a program prior to installation. The detailed reports verify that the program is performing as predicted internally, as well as producing correct output.

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The Verification phase is marked by a high level of job activity. Testing individual programs and linkages between programs generates a lot of

work for the computer. To ensure that Verification is not hampered by poor turnaround, use ROSCOE's conventional RJE to get those jobs in and out of the machine room FAST.

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Firms Must Consider Workers' Rights

(Continued from Page 1)

portant not only for humane reasons related to the individual worker and his family but also for economic stability. We need to maintain purchasing power adequate to purchase all the goods and services we can produce.

Computer technology should be introduced at times when the expanding fortunes of a plant, an industry or the economy can absorb its displaced labor. Layoffs should be avoided through the use of transfers and retraining. Work forces should be reduced through attrition rather than layoff.

In multiplant corporations, arrangement should be worked out to absorb workers by offering transfers to other plants without economic losses which might arise from the need to relocate, sell worker-owned homes, purchase new homes and move family and personal effects to a new location.

Corporations normally protect their executive and managerial personnel in this way. But there is a more compelling need to protect the equity of the manufacturing worker, because he is less able to absorb these costs than a company executive.

If layoffs cannot be avoided, human values should be preserved during the periods of unemployment with supplemental unemployment benefits, continuation of group life insurance policies and hospital-medical-surgical coverages for the laid-off worker and his family. Vesting of

pension benefits should be achieved at the lowest possible levels of service to avoid adverse impacts on retirement security.

Alleviating Boredom

Present worker skills must be adapted to new computer technology. Employer-financed training and retraining is important to this end. When computers first came into use, it was generally assumed that a programmer needed at least a college degree. Experience now has established that outstanding programmers come from the ranks of those with a knowledge of machine tools, metals, cutting tool capacities, etc.

Computers (and automation in general) can change the nature of work. A computer made available to an engineer is a challenging and creative new tool which eliminates drudgery and opens new horizons. But the computer also creates a need for keypunching, one of the least challenging, most repetitious and boredom-laden jobs in industry.

Expanding interest is being shown throughout the industrial world in efforts to change the nature of work and how we perform it and to make it a more challenging and satisfying way to spend one-half or more of our waking hours.

Many proponents of such job improvement efforts claim it results in better quality and higher productivity, but the goal of relieving industrial boredom alone is worth the effort. Employers are experi-

menting with job expansion, job rotation and participative management.

This effort should be encouraged and expanded. It has been aptly described as an effort to fit work to human beings, rather than fitting human beings to work.

In cases of plant remodeling or construction, architectural and equipment innovations can play an important role to this end.

Mobile Skills

While the individual employer can do many things to promote these goals, the responsibility for many of the desirable manpower adjustment mechanisms must reside in government.

Training and education to attain desirable worker mobility can best be achieved by a national, tax-supported program.

While an individual employer might be concerned about training a worker for periods of continued employment with that company, he would be little inclined to assume the cost of training to permit the worker to transfer to another employer. Yet, such worker mobility is vital to the interests of new and expanding industries.

The items suggested herein are by no means an all-inclusive list of priorities for our attention. Rather, they indicate the path of travel.

Anthony W. Connole is administrative assistant to UAW Vice-President Douglas A. Fraser.

Burroughs Adopts Bipolar Memory in 4790, Mini

(Continued from Page 1)

particular program's run time environment at run time, similar to the operation on B6700 and B7700 CPUs. It allows the operator to load a data file on another device than the one called for to better balance the configuration, Burroughs said.

IBM, Univac Raise Prices

(Continued from Page 1)

Peripheral product lease prices increased by 6% and include the 3410 and 3420 tape systems, the 3330 and 3340 disk drives, the 3211 and 3203 printers and the 3740 data entry systems.

Lease and purchase prices will be increased 6% on the 370/135 CPU and on the 2420 tape system, the 2311 and 2314 disk drives, the 1403 printer and on industry-oriented terminal systems such as the 3600 financial system, the 3650 retail system and the 3660 supermarket system.

The lease price on the System/3 will jump 8%, as it will on all of the System/3 I/O gear (the 5400 Series). The System/3 purchase price, however, is not affected and the System 3/8 announced recently will not be affected.

In addition, the lease and purchase prices on the 370/145, 370/158 and 370/168 CPUs will go up by 8%, the firm said.

The three basic configurations in the 4790 Series, which do not replace any of the previous models in the B4700 Series, are the B4790, B4791 and B4792.

The B4790 has a CPU, 300K bytes of main memory and 16 I/O channels. The B4791 is the same but with 20 I/O channels and a file protect memory; the B4792 has two CPUs, 600K bytes of main memory, 36 I/O channels and file protect memory.

The file protect memory allows multiple programs and multiple processors to share data files in a common disk storage data base. This provides positive protection against multiple programs simultaneously updating the same data records, Burroughs said.

Front-End Mini

The B774 systems and communications minicomputer is capable of handling up to 32 half-duplex asynchronous or bi-synchronous lines. The B774 has an 8K-to 96K-byte bipolar memory, operates at 1.7 MHz/sec and is microprogrammable.

Up to eight B774s can be connected to a B4700. Burroughs suggested, however, that a maximum of four would be practical on a B2700 and six on the B4700 unless applications required little CPU main memory.

The B774 is programmed with the Net-

work Definition Language used on the front end of the firm's larger B6700s and B7700s.

First deliveries of the B774s are scheduled for the end of this year with prices for an 8K and four-line model starting at \$42,000 or \$950/mo.

First deliveries of the B4790 systems are scheduled by the end of next year. A B4790 with 300K bytes of memory, card equipment, printers, two tape drives, dual disk drive and head-per-track disk will run at \$1 million or \$25,000/mo.

Net Nabs Kidnapper

(Continued from Page 1)

the terminal Tashiro was using whenever he made a withdrawal.

Meanwhile, the police diverted 370 patrolmen to almost all the terminals on the network. And when the central computer reported that Tashiro was withdrawing money from an autoteller in Tokyo's main railroad station, police staked out at the site were tipped off by walkie-talkie.

They arrested Tashiro at the exit, Parker said.

The whole affair caused a sensation in Japan, where newspapers billed the caper as Japan's "first computer crime." Both the police and the bank programmers were awarded government citations for their work in catching Tashiro.

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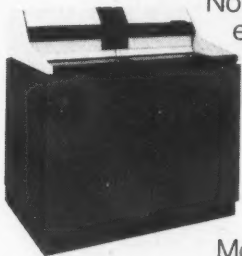


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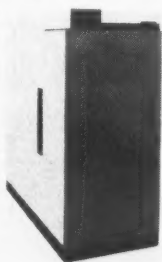
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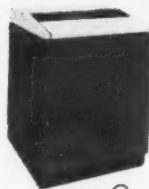
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UK Report Finds Research Threatened

Triad of Data Banks Seen as Way to Protect Subjects

By Nancy French
Of the CW Staff

LONDON — Researchers are in danger of destroying the delicate relationship they have with the public if they don't do a better job of guarding the privacy of data they collect, according to a report published recently by the British Association for the Advancement of Science.

Seeking answers to some of today's complex human problems, social scientists are often forced to comb for clues among highly personal data provided voluntarily by the public.

Patterns of disease and social change, for instance, often lie buried in masses of apparently unconnected details concerning people's lives and habits.

Although the report says the association has heard only a few rumblings to date, such as people refusing to cooperate with the census or refusing to permit researchers into some ghetto areas, public resistance could become "bad enough to distort results" and prevent beneficial research, according to the report.

Titled "Does Research Threaten Privacy or Does Privacy Threaten Research?", the report cites five areas of concern:

- Increasing compulsory collection of research data, such as the census.
- Use of information filed by schools, hospitals, etc., which was collected for other purposes.
- Building large stores of personal information which may be tapped by police, employers or others to whom subjects would not give this information voluntarily.
- Use of data for the study of topics very different from the one the subject had in mind when he gave the data.
- Fear that policy decisions will be increasingly based on the data picture of a group rather than on contact with real people.

Performance Group Issues Invitation To Fall Conference

COLUMBUS, Ohio — The Computer Performance Evaluation Users Group (CPEUG) will hold its Fall 1974 meeting at the Neil House here Oct. 23-25.

Although CPEUG is primarily a government users group, participation by members of the commercial and academic DP communities is growing "and is encouraged," according to group chairman William J. Letendre of the U.S. Air Force.

"Anyone who has something to say or learn" about the field of measurement and evaluation is welcome, he said, adding that the program will include presentations to the group as a whole and small group sessions to zero in on a product or technique in which both presenters and attendees are interested.

There is no need for prior submission of a completed paper to make a presentation, according to program chairman Dennis Gilbert of FedSim. Minimum requirement, he said, would be an abstract, one or two typed pages long and photo ready for reproduction. This is needed so that the program can be planned in an orderly fashion, he explained. Submissions for presentation should be sent to Gilbert, c/o FedSim/CA, Washington, D.C. 20330 by Oct. 5.

Registration fee at the CPEUG meeting will "probably be about \$10," Letendre said, with the exact cost determined by the direct costs of the meeting.

Requests for room reservations at the Neil House should refer specifically to the CPEUG meeting, since special rates have been arranged for attendees, Letendre said from his offices at the Electronic Systems Division, Hanscom Air Force Base, Bedford, Mass. 01730.

"Not conspiracy" but "absentmindedness and public apathy" are the greatest enemies of privacy, according to the association.

The association suggested that a special type of data bank be created to house research data.

Data collected in a research data bank would be forbidden by law to be used for any administrative purposes.

Research data banks would be licensed and would be exempt from all subpoenas, court orders, other government directives or demands for identified personal information.

The license would provide for a single publicly named individual to be legally responsible for the data bank.

The research organization, the named individual and the person who commits any violation would be liable to criminal penalties for violating the terms of the

license and to civil action by any injured party.

The report suggested a research data bank consist of three separate and distinct files, one containing data, the second containing personal identification and a third linking the other two in such a way to make it impossible to remove identified personal information without explicit approval of the person responsible for the data bank.

As an extra safeguard, the link file should be maintained by a different organization than the one maintaining the data bank, the association suggested.

This would prevent a researcher from using existing data for compiling a list of people to be contacted for follow-up studies unless that researcher had obtained permission from the subjects at the time of the original interviews, the report said.

The report suggested a code to protect research subjects:

A researcher will explain the purpose of the study, name the sponsor and say if the results will be published; leave a card containing his name and address and a summary of this code; specify how the data is to be kept and what will be done with it when the project is over; not give the identified data to any other person for any purpose; and refuse to divulge the name and address of the subject for any purpose without first obtaining explicit permission.

In addition, the report said, the researchers should ensure that this code still applies if the subject is a member of a captive population such as a school or hospital, assuring the subject that the institution is not putting pressure on him to participate and no sanction will be applied to anyone who refuses.

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Mini Making Headway as Manufacturers' Economizer

By Nancy French
Of the CW Staff

NEW YORK — The manufacturing plant of the future will use minicomputers for both monitoring and control of plant operations, probably with the support of a computer hierarchy, predicted Thomas R. Gaughan, manager, systems services, Celanese Corp.

Reports from companies that have successfully implemented manufacturing information systems to beat skyrocketing costs without sacrificing quality seem to back up that forecast.

At a recent Info '74 session, Eric Knutsen of Eric Knutsen Associates described how Airwick Industries, Inc., a \$35 million company "in transition," met the challenge of "introducing disciplined, computer-based manufacturing systems into the company in a profitable, orderly fashion."

Not big enough for an elaborate corporate structure, yet outgrowing the informal, "reactive" style of management

that marked its earlier years, Airwick needed a system to assist with planning and control and to serve as an interface for the company's various functional departments, Knutsen said.

The company needed to forecast inventory needs based on anticipated seasonal sales variations and sporadic promotions, smooth out an irregular production schedule that often demanded hiring inexperienced day laborers to "get the product out" and assure that necessary raw materials were in the plant.

Control was required for product inventory and costs, including both cost computation and production reporting.

In the area of finance, the company wanted a configuration to link all reporting systems. The functional interfaces would link marketing with forecasting and inventory control to make planning a reality. Finally, R&D would be integrated into the product structure.

Today Airwick has such a system, according to Knutsen, and the secret to its

successful implementation was "not trying to do everything at once."

A materials planning system was implemented in early 1972. "We got three-month and annual options on the computer and got enough in the parts file to make the system go," Knutsen said.

As a followup, the company worked on standard cost and purchase plans, a labor plan, exploiting bill-of-materials data and introducing more planning.

Forecasting for production planning came late in 1972 when the company formalized its marketing/production planning interface.

Production reporting and cost control was implemented in 1973, allowing Airwick to monitor performance. Inventory control arrived in late 1973 after a data base was developed.

Purchasing and, finally, work-in-progress, which involved tying in accounts payable — the trickiest part — evolved by 1974, Knutsen said.

Displacement of old equipment and dis-

continued use of a service bureau and time-sharing were early benefits of the system. Cost displacement in the form of inventory reduction, reduced plant overtime and purchase discounts followed.

Sales increased, due partly to balanced stock and more timely order filling, and management planning and control provided deeper insight into how to really run the business, Knutsen said.

Celanese met with similar success, according to systems service manager Thomas R. Gaughan.

A diversified chemical company with sales approaching \$2 billion, Celanese manufacturing processes range from continuous flow to job-shop, Gaughan explained.

Effective use of manufacturing information systems has increased profits for Celanese, according to Gaughan.

Mini, Canned Software 'To Put DP Power' At Heart of the Job

NEW YORK — Minicomputers and canned software packages comprise the future of distributed processing for manufacturing organizations, a speaker said at an Info '74 session on new hardware and software in manufacturing.

Described as "putting computer power where the job is," distributed processing will depend on "clustered minicomputers and miniprocessors, each dedicated to a single application like product distribution, materials planning and shop floor control, according to Jack R. Smith, manager of distribution and information services with I-T-E Imperial Corp.

But "proprietary systems assume a common need," Smith remarked and he doesn't believe the sense of this need has been sufficiently developed by manufacturing organizations.

"Anyone who's ever worked for a manufacturing organization knows the problems of a decentralized system," Smith noted. "And the fact is that the task of providing the interfaces for a variety of software packages, each run on a separate mini, is too complicated for most manufacturers to produce in-house."

He contended all kinds of applications, from forecasting and finished goods inventory management to production planning and materials scheduling, are available from several suppliers.

Smith mentioned innovations in canned software packages from two companies.

Industrial Nucleonics, Columbus, Ohio, has developed a mini with a microprogramming capacity for use on the production floor.

Called Accu Ray, the system permits on-line editing, master scheduling and reporting.

Meanwhile, Codon Corp. in Bedford, Mass., has created a turnkey mini-based on-line distribution system. Centered around a PDP-11/45, the system comes with installation, training and "whatever other handholding the manufacturer may require," according to Smith.

Despite these exceptions, he noted a general lack of quality in the products offered manufacturing by software firms. "Developers usually don't understand manufacturing problems, and manufacturers have no sense of the constraints of a system."

Poor user documentation, lack of complete systems and the difficulty of pinpointing the causes of problems combine to make the prices of these systems too high.

Smith urged manufacturers to understand the "total" requirements of their production facilities and to compare the offers of another software house.

He also suggested they "pilot" test each step of the system and that they demand a contract with the developer requiring his presence on the production site while the system is being implemented.

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Location, Access and DP Auditing Factors in Security

By Nancy French
Of the CW Staff

NEW YORK — If the data housed by your DP installation was, instead, a million dollars in cash, would you have to institute new security procedures to protect it?

If the answer is yes, your security measures are seriously deficient, according to security consultant Louis Scoma Jr., president of Data Processing Security, Inc., who spoke at a panel discussion here recently.

Security measures are getting worse, not better. The number of people who have the technical know-how and the opportunity to embarrass or financially jeopardize a company through the use of its information is growing, warned Ed Bride, vice-president, editorial services at *Computerworld*.

"New electronic funds transfer systems provide even more serious opportunities for diverting funds from [one] bank account to another and the crook getting

halfway around the world before the theft is discovered," Bride said.

The answer, however, is not to "throw your hands up and do nothing or lock up the system and classify everything," Lindsay L. Baird Jr., a former military DP security specialist now with Advanced Computer Techniques Corp., remarked.

Attendees were urged to test their systems by determining all the ways they could be beaten and then taking steps to plug loopholes by placing greater controls on access and investing in audits and other controls that would reveal tampering.

Bundled Security

According to Bride, the opportunity for deliberate internal abuse can be directly correlated to "laxity in procedures and personnel practice and sheer reluctance to apply common sense to the problem."

Correlating the reluctance of users to spend the necessary dollars for effective security with drivers who would be un-

willing to install optional air bags in their new cars, Bride predicted that IBM would have to bundle the cost of data security into the price of a system to get users to adopt such measures.

Security begins with choosing the proper location for the DP center, Scoma said, and that doesn't mean "on the first floor displayed proudly behind plate glass windows."

Entry should be restricted only to those who have a need to enter and every "sensitive" as well as "key" staff person should have a security check.

"The tape librarian who makes \$6,500 a year, for example, is a 'sensitive' position," he explained.

"Don't overlook the clean-up crew or your top engineers either," he cautioned.

Define your security needs, Baird suggested. Once defined, the problem is half solved, he said.

After the system has been tested to determine its vulnerability and what can be done to protect it, the auditor should

be brought in.

Most Fraud Found Accidentally

Only 15% of computer fraud is discovered through audit and security measures; the rest is discovered by accident, according to Joseph J. Wasserman, president of Computer Audit Systems, Inc.

The auditor's role in modern business is changing, Wasserman noted. The auditor of yesteryear, who knew exactly where to spot overspending on an expense account, is evolving into a "devil's advocate on behalf of top management."

By evaluating procedures and security measures after they are designed, the DP auditors close the security loop, he explained.

The work of the DP auditor can safeguard a company from programming errors that are costing business more than all deliberate attempts to steal through the machine put together, Wasserman said.

"Such errors, with no criminal intent, can destroy, scramble or lose data" costing thousands of dollars.

"The best line of defense is a combination of properly supervised operations, systems that incorporate good management controls and effective computer auditing, he said.

"It is the auditor's responsibility to ensure that computer systems can be audited once they become operational.

"It has become increasingly difficult to audit using conventional techniques because hard copy printouts are being curtailed and often source documents aren't available.

"More often than not, information required by the auditor is available only through additional costly computer runs," he added.

The DP auditor should make best use of the computer as an audit tool by building in routines, where feasible, to make auditing work a by-product of the regular operation at little or no extra cost, he concluded.

Publication Planned For Banking DPer

WASHINGTON, D.C. — *Thruput*, a monthly newsletter designed for bankers responsible for the operations and data processing functions within their banks, will roll off the presses for the first time here during the first week in October.

Put out by the Operations/Automation Division of the American Bankers Association (ABA) in cooperation with the ABA communications group, the publication will aid communication between its readers and the division, according to F.E. Kahn, director of newsletter services for the association.

Thruput's annual subscription rate for 12 issues will be \$12. Kahn said he expects to have several thousand readers out of a potential market of some 20,000.

Thus far, only ABA member bankers have been solicited for subscriptions, he commented.

In the next few months, Kahn and his staff of two journalists will also produce a quarterly devoted to automated clearinghouses for the National Automated Clearing House Association.

Buy Computer, Save Car

COWLEY, England — How do you test a new car's crashworthiness without touching its gleaming fender?

With computers, of course. Dr. William Emerson of British Leyland's Engineering Development Department, can crash 40 or 50 simulated vehicles a day into telephone poles, concrete walls or one another.

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'Biggest Ripoff,' Speaker Says

Executives Must Quash Claims of Special Immunity

By Edith Homes
Of the CW Staff

NEW YORK — Top management can best serve the data processing function within its firm "by putting a stop to the biggest ripoff perpetrated against American managers over the past 20 years," Harry T. Larson, director of planning for California Computer products, told an audience of general and DP managers at Info '74 recently.

"Top executives can no longer allow DP departments to claim immunity from normal management methods," he said. "By refusing to accept the snow job usually received from these departments, we might begin to understand why so many computer systems operate inefficiently, why computer people often work well below achievable productivity, why we have application failures and why DP developments tend to fall short of promised time and cost schedules."

Once DP's "cloak of special sophistication and mystique" is stripped away, firms should also be able to determine where computer manufacturers are selling them short on equipment and services, he added.

Larson argued that DP's growing percentage of company costs — currently between 1% and 4% of the budget — plus the use of data processing throughout many organizations and the power exercised by the function as a result, all necessitate the attention of top management.

"Executives have a responsibility to make such departments efficient and effective and to insure that a growing investment in DP actually reduces costs," he noted.

Computer people, motivated to expand,

Gap Narrows Slowly But Top Executives Still Shy From DP

By a CW Staff Writer

NEW YORK — "Last year only one person in an audience of 200 was a general manager, and this year 10 of you out of about 100 are corporate executives; I think that's progress," Chairman Michael J. Samek, vice-president of Management Services for Celanese Corp., told his Info '74 session on "Management and the EDP Manager."

Designed to explore the causes behind "the management gap" between corporate executives and DP personnel, the meeting indicated many managers suffer from a lack of knowledge of the growth of the industry over the past 20 years.

"Much of top management is back in the 'gee whiz' era of computing — spanning the mid to late '50s," commented Allan F. Proske, vice-president of systems and planning for Manufacturers Hanover Trust Co.

John E. Austin, lecturer of business administration and direction of laboratories at Harvard University, agreed, commenting that many managers at the top have never dealt with the intricacies of information systems.

He suggested perhaps the greatest obstacles facing those who try to manage DP departments are the lack of good measures to relate the success of DP operations to overall company goals, the wealth of projects undertaken which fail to match a firm's DP capabilities and the absence of a common language between managers and data processors.

Despite these explanations, the audience, composed primarily of DP managers, contended the gap would have to be bridged by themselves. "We can't expect top management to be concerned enough to make the effort," said one attendee.

and computer companies, motivated to move hardware, seldom consider the goals of the companies they serve, according to Larson. In his view, only top management is in a position to "redirect DP to overall organizational objectives."

But, in order to cross the barrier Larson contended has been erected by the computer world, top executives will have to provide "better than average management."

Thus far, supervision and management in DP have been woefully inadequate," he said. The reasons for this are varied: the trade is young, neither DP people nor executives have seen the need for emphasis on basic management methods in a largely technical function and DP types tend to be professionals before they are "company people."

Larson suggested that executives improve their control over DP and DP's

control of itself by emphasizing management and supervisory training programs, by hiring private enterprises to teach DP management, by drawing on experience gained from working with research and development divisions and by moving more proven managers into DP.

DP people will also have to commit themselves to three fundamental corporate goals, Larson commented. "They will have to learn to keep to a time schedule in completing projects, to work within the proposed budget and to create products that will perform as intended."

To meet the complaint that DP divisions often fail to solve "real world problems," Larson advised managers to emphasize heavy user involvement and to make users accountable for the results of a system when they are put in charge.

The explosive growth of the computer industry, "professional prerogatives" and

inadequate measure of performance have allowed many incompetent people to remain in DP, according to Larson. He recommended executives "weed out the deadwood" in their DP organizations by dropping 10% to 20% of the poorest producers.

Encouraging management and DP divisions to work together, he emphasized the need to stop accepting defective systems from computer manufacturers. "Charge the computer supplier for your costs; sue them if necessary," he said. "Team up with other users and don't be the first to buy a new operating system."

Finally, Larson charged top executives to "get to know your DP people. You can't expect them to absorb management's viewpoint unless you develop a mutual understanding and a team approach designed to achieve common goals," he said.

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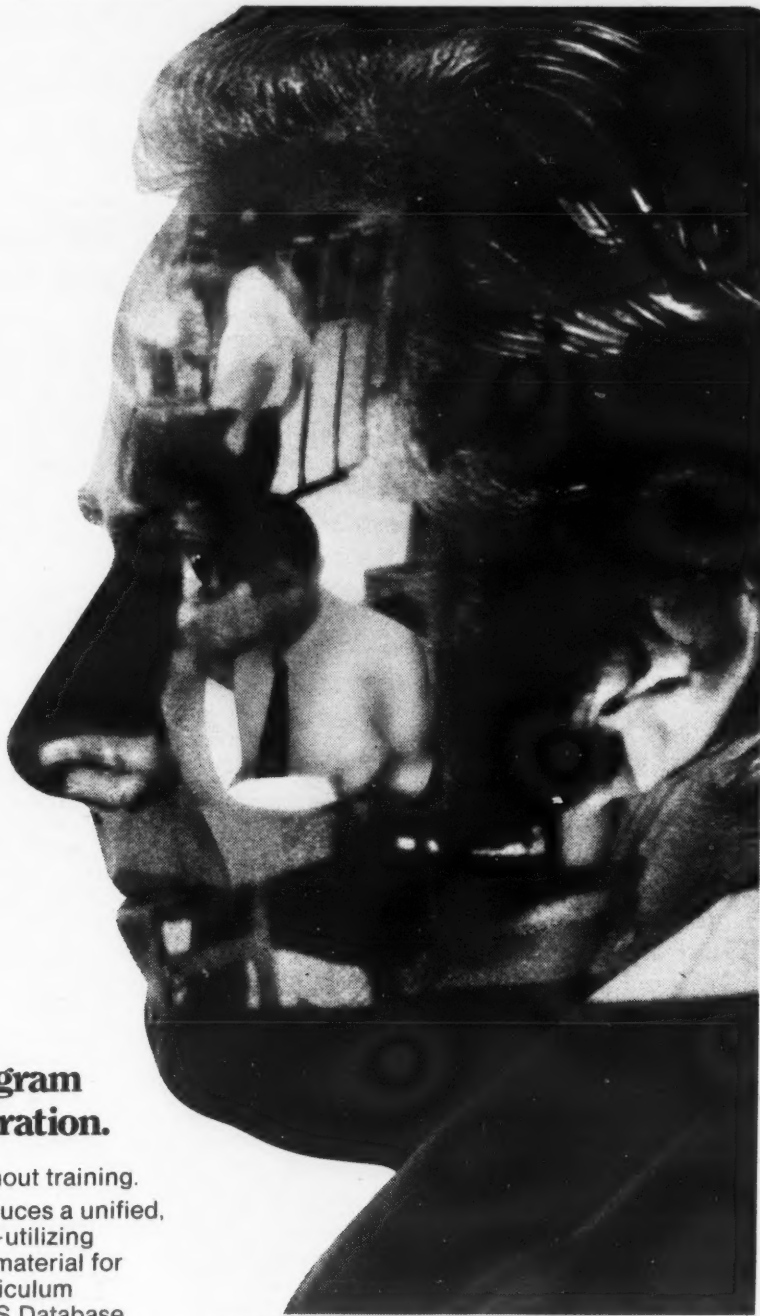
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Editorials

Incompatibility Fears Allayed

Incompatibility is grounds for divorce in many states; the same problem could bring an end to many user-vendor "marriages" if the coming generation of "new," "future," "modular" or whatever systems demands extensive conversion and reprogramming.

This point was made by Kornel Spiro, manager of market analysis for Amdahl Corp., in a discussion of future computers with Info '74 attendees. And it's a point well taken.

The software used with today's systems represents an enormous investment of blood, toil, sweat and tears, not to mention money, by users and mainframers. Users will insist their investment be protected.

But perhaps even more importantly, users are becoming ever more dependent on the continuous availability of their systems. For many, the potential disruptions of a conversion effort would be intolerable.

Fortunately, the mainframers seem well aware of the problem, and the hardware characteristics of the next generation will probably be innately suited to the untangling of compatibility snags.

In the Telex/IBM suit documents, early IBM plans for future system software carefully addressed the problem of programming, data and language compatibility and concluded that easy conversion would have to be a top priority.

In setting out the basic specs for "System Q," the operating system under development at IBM for use with Future System hardware, planners determined that "Q" would run OS/360 and OS/VS software "concurrently" with new applications. Honeywell has already introduced this concept for users of its new Series 60 hardware who are moving up from the older Series 200/2000 operating system to Series 60 GCOS.

So the omens are good. Apparently the mainframe builders realize users are wise to the upheavals of conversion and that incompatibility is no longer salable — no matter how shiny their new machinery looks. The 360 nightmares of a decade ago seem to be permanently behind us.

No Second Chance

The vote counting foul-up in Washington D.C. this month underscored once again the public's sensitivity to highly visible computer problems.

The exact source of the election board's problems hasn't been revealed — it may have been programming bugs on the part of either the board's DP staff or Control Data, or hardware breakdowns, or a combination.

But, as usual, "the computer" took the blame. And there was blame aplenty — not because there was anything especially unusual about the snafu from a DPer's point of view, but because the foul-up occurred while the system was performing in a public spotlight.

The resulting publicity was clamorously anticomputer, despite the fact that in the end the vote counting took only a little longer than it used to when votes were routinely counted by hand.

The moral seems to be that public expectations are high when computers come into the picture — and woe to the system that lets people down.

The Washington incident points up the acute need for systems to become almost perfectly reliable as more on-line, up-front applications are implemented. The public, it seems, won't tolerate delays once they've learned to count on speed.

So, like it or not, fair or not, systems designers may have to avoid "experimenting" with highly visible applications. Systems that don't work the first time, all the time, will bring their creators nothing but the slings and arrows of an outraged public.



'You Hit Him High and I'll Hit Him Low'

Letters to the Editor

Credit Bureaus Are Complying With Fair Credit Reporting Act

Re the Sept. 11 article entitled "Privacy Top Concern of Americans":

Apparently, the writers of publications suffer the same problems that computers do: garbage in, garbage out.

The attack on credit bureaus is absolutely unwarranted. There has already been national legislation to provide all but one of the items in Harris' survey. It is the Fair Credit Reporting Act, which was signed by the President in 1970 and became law in April 1971. It is being enforced by the Federal Trade Commission.

The vast majority of the credit bureaus in this country are complying 100% with the federal legislation. Every consumer has complete protection of his privacy.

Among other things, the Fair Credit Reporting Act gives every consumer the right to full disclosure of all items contained in his credit record at any credit bureau, if and when he is refused credit, at no charge to him.

In addition, if he has not been refused credit, but is merely curious to see what his record is at a credit bureau, he may have the information disclosed to him for a small rate.

The only item in Harris' poll that is not provided for in the Fair Credit Reporting Act is for a consumer to be issued a written copy of his report. Sen. William Proxmire (D-Wis.) and others on the committee who drafted this bill knew that this would not be a good idea because it would allow the possible forgery of credit reports.

I think that the readers of *Computerworld* should be informed that the Fair Credit Reporting Act does exist and is being complied with by the vast majority of all credit bureaus in the U.S.

Ken Opp
Manager

Credit Bureau of Lincoln
Lincoln, Neb.

Search for 'Professionalism' Purely a Matter of Economics

In response to Willie Grafal's article in the Sept. 11 issue of *Computerworld*, I say "Bravo." It is very refreshing to find someone who is sane and logical and who understands what a DP professional should be.

What he doesn't state is the reasons for DP organizations, certificates of achievement and grandiose titles in our profession. In my estimation, they simply allow us to sell our talents to an employer at a reasonable rate of pay.

After all, every personnel manager (who usually doesn't know a byte from a snow job) knows that someone with a B.S., M.S., Ph.D., CDP, etc. and is a senior programmer, systems analyst or project leader with one year's experience (on a 360/20) is

worth \$10,000 a year more than a senior analyst with only 10 years experience (covering all systems, three high-level languages and all phases of job experience from operator to assistant DP manager). Right fellas?

Dean A. Slone
Systems Analyst

Kwikset Division Emhart Corp.
Anaheim, Calif.

Here's to a True Professional

Willie Grafal's article in the Sept. 11 issue was a masterpiece.

The article was the reality of DP. His ideals and principles applied to the DP field should be an inspiration to all DPer's. He is a true professional.

Gene M. Leonard
Computer Operator

Intercraft Industries Corp.
Carson, Calif.

Story Combination Incongruous?

It seems somewhat contradictory to read on the one hand about the continuing concern over security in data processing and the special problems caused by the "insider," and on the other hand to find the occasional article such as the one in the Aug. 28 issue ("Youthful Offenders Learn Programming, Save State's Money") extolling the rehabilitation of prison inmates through data processing.

Donald K. Rhett
Systems Analyst

Kaiser Foundation Hospitals
Oakland, Calif.
Not to us. Ed.

Voter Registration Up and Running

The front page article "Plan to Register Voters Shelved" which appeared in *Computerworld* on September 4 was not true in stating that Maricopa County, Ariz., was the first county in the nation to attempt on-line voter registration.

Here in Lee County, Fla., I was directly involved in the design and development of an on-line voter registration system. Our system has been in live operation for well over a year now and appears to be quite successful.

Gerry P. Karpf
Staff Analyst

Lee County DP Center
Fort Myers, Fla.

(Other letters and viewpoints on Pages 11 and 12.)

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

Letters to the Editor

CDP Program Does Require Signature on Ethics Code

Well, Al Smith has done it again!

In his letter to *Computerworld* [Sept. 4] he states that several employees of Equity Funding could have passed the CDP exam and that we should forget about certification and work toward establishing a code of ethics.

Smith apparently has a very severe case of tunnel vision. In his rush to condemn the CDP program, he has not had time to investigate what the program stands for.

The CDP program does, in fact, require that the holder of this credential subscribe to a detailed code of ethics and good practices. Space does not permit me to quote the entire code. However, I would like to quote a part of paragraph 1.3 of the preamble. It states:

"The Certification Council reserves the right to revoke any Certificate in Data Processing which has been issued by it in the event that the recipient violates the 'Code of Ethics,' as amplified by the 'Code of Conduct'..."

It must be rather uncomfortable for Smith to write with his foot in his mouth.

Jens P. Christensen
Superintendent

Insko Systems Corp.
Neptune, N.J.

Kicking IFs Out of Nest May Be Easiest Solution

I would like to comment on Dennis Omlor's article [CW, Sept. 4] on the new acceptability of nested IFs (which I take to include compound IFs), based on my experience as a programmer.

Omlor suggests that the old reason for avoiding them, the maintenance difficul-

ties, no longer holds.

I suggest there are still compelling reasons for avoiding nested/compound IFs:

- They are more difficult to think and write out.

- Two people looking at the same IF statement will often interpret or evaluate it differently. There is never any ambiguity in looking at a simple IF statement.

- Many higher-level languages interpret them as follows: Evaluate first IF statement and set a switch... Evaluate last IF statement and set a switch. Do a Boolean analysis of all switches. Evaluate outcome of Boolean analysis of all switches accordingly.

Results: more time spent in compilation and execution and more core used. Compare this with the practice of any Assembly language programmer.

- The rule in flowcharting is "only one statement per box." Not only is it easier to read, but all possible branches are accounted for.

- Finally, simple IFs eliminate the need for truth tables.

Incidentally, I have noticed that, generally speaking, programming experience and complexity of IF statements vary inversely; perhaps that is what experience teaches.

Howard A. Karten

Randolph, Mass.

In Complete Agreement

I am in complete agreement with Julie Wilson's letter [CW, Sept. 11] against sexism in advertisements.

Perhaps a practical article on "How to Write a Nonexploitive Ad" should be written so sales can be made without prejudiced copy.

Mary Fowler

Physics International Co.
San Leandro, Calif.

If Dictionary Consulted

Calling Programmer 'Independent' Can Be Derogatory

Ted Willoughby is a distinguished member of the special interest group on computer personnel research of the Association for Computing Machinery (ACM). However, I fear that some of his research may have hindered the growth of real understanding of programmers by taking too defensive a role on their behalf and not using a certain amount of imagination before rushing to the library shelves and dictionaries.

Willoughby defended programmers against a comment made by Dick Brandon that "the average programmer is excessively independent — sometimes to the point of mild paranoia."

A bit strong perhaps, but then Dick is quite a strong speaker and the occasion was the 1968 ACM conference, when the attendees needed some waking up.

Willoughby came into the matter some years later and claimed that Brandon was all wet in his generalizations. Not only were Brandon's statements unsupported by the published research data, he said, but wherever the evidence is directly comparable the published data supports the opposite conclusion.

Willoughby's argument, which may have relieved many programmers, was that various psychological tests had not proven programmers to be particularly independent people, as Brandon had claimed. This argument was weak.

But perhaps the biggest weakness in the Willoughby study was the author's ap-

parent failure to listen to Brandon for the information he was conveying rather than for the dictionary definitions of the words he used.

Brandon was talking about programmers while they were programming, not while they were sitting around taking — or faking — psychological tests!

What Brandon (like many of us) has to deal with is the results of programmers working on programs. And what he must listen to are the reasons they use to explain their actions or inaction.

Moreover, the time when a researcher is likely to focus his attention on a particular programmer will probably be when a mistake has been made or a potential problem is involved. This is when the typical programmer behavior, which Brandon characterized as "excessively independent," will occur.

What Willoughby should have done, if he wished to investigate Brandon's statement, was look at the effect of the programming environment upon the behavior of programmers. A man can be changed by his environment, as those of us who drive a car regularly know.

The Programming Environment

Currently the programming environment has three functions: to receive data or specifications, to produce some programs from the data submitted and to try to explain what has happened.

The programmer himself is responsible only for the second function, and is at the mercy of both the people who provided him with specifications and the use to which operators and others put his creation, the program.

Programming specifications themselves are blatantly inadequate. We simply do not know how to give specifications well

Changing Instruction/Day Count May Thwart 'Good' Programming

By J.A. Morin

Special to Computerworld

William A. Delaney's comments in the "Viewpoint" article entitled "Raw Count of Instruction/Day May Reward Poor, Not Good, Code" [CW, Aug. 21] are a classic example of stating a problem that is obvious without offering any solution.

DP types have been accused of being bad managers and certainly one poor management practice is to criticize or find fault without offering solutions.

Therefore, I offer the following (very elementary) solutions to the small problems that Delaney pointed out.

Weighting Factor

When a task is evaluated and there are special considerations (i.e., real-time environment, memory problems, complex programs, etc.), just assign a weighting factor. Typically assigning a weighting factor for complexity will add a motivational push to the programmer.

As to the problem of the programmer who purposefully generates excess coding to achieve a gloriously high number of instructions per day, several options are open as solutions.

- Do nothing about it. If this guy meets or beats deadlines and doesn't completely burn up machine time, evaluate him for what he is — a sharp, fast (he has to be fast if he is going to write all those extra instructions and debug them) programmer.

- Add another quantitative measure — that of counting total instructions generated, not checked out instructions. In other words, count all errors, additions and instructions written and then deleted or changed.

If a sharp and bright programmer can

write 2,000 instructions where 1,000 would do it and do it with the same statistical numbers of errors as a 1,000-instruction program, more power to him.

- Add the measurement of number of compilations and recompilations. This can be included in the initial estimate along with the instruction/day.

Rebuttal

No Chance

I also want to comment on Delaney's example of the programmer who got "promoted" unjustifiably. This appears to be a case of the first programmer not having a chance.

As everyone knows, it is easy to come in after a program is done and tear it to pieces. Who stops to consider the horrors the first programmer may have had to live with, such as working on other projects at the same time, building initial test data, reprogramming last minute changes, etc.

Hero

Obviously the second programmer looks like a hero. In this case I am sure Delaney would agree a weighting factor accounting for the second-time written environment should be applied.

The elementary considerations needed to cope with the minor problems mentioned by Delaney are obvious. I would hope to hear from people who also have suggestions on how to better utilize the instruction/day technique which I support.

J.A. Morin is employed by NCR in Denver, Colo.

The Taylor Report By Alan Taylor, CDP



ceived and accepted as adequate. This is where he may claim that the specification writer should have known that if he didn't tell him that leap years occur every so often, the programmer had a right to decide whether to believe in leap years.

A programmer may, and often does, also claim that because some particular restriction (such as there being not more than eight types of discount plans) causes him less work, then he can, in the absence of specific orders, decide for himself about such matters.

And thus we have the "independent programmer" syndrome.

20/20 Hindsight Requirement

Looked at ahead of time, these decisions, even if they are recognized for what they are, will not be understood in the rush for achievement.

Only in hindsight, when the problems that were implicit have become explicit, are questions raised.

The day that a programmer as a matter of course will examine his system plan, list for management all the implied decisions it contains and work hard trying to find out the implication of those decisions before writing his codes is not yet at hand.

And there lies the problem of the paranoid programmer. Programming has a 20/20 hindsight requirement!

That is a real problem, worthy of a real examination instead of a facile academic exercise leading to its dismissal by our premier academic/professional body.

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'Wrong Answers No Virtue'

DP Heading Toward Mediocrity in Sophisticated Way

By Burton Grossman
Special to Computerworld

I have framed Tom O'Connor's letter [CW, Aug. 7] and it hangs on my office wall. I never was lucky enough to meet him, but some day I hope to. I would like to give my translation of it for Phil Curry, as he requested in the Aug. 21 issue.

Take any recent issue of *Computerworld*. In it one will find one or more stories of serious trouble due to DP errors — i.e., the welfare mess. One also will find 50 stories on new whiz-bangs and super-widgets that probably will never see daylight.

If our "profession" will remember that results count, we may be on the right track. It is no virtue to provide wrong answers in nanoseconds — we need right answers in any time.

What is the correlation of the above? It merely is that our efforts all seem to go

toward being mediocre in a more sophisticated manner.

This of course is led by IBM, which can quiet customer complaints by announcing the next generation. Just what we

Viewpoint

need — on-line maintenance by satellite; I'd rather see IMS work properly.

As for the other vendors, "plug-to-plug compatibility" has replaced the great American virtue of innovation and superiority. The only contribution they have made is to be a dollar cheaper and make many lawyers rich. Once again we reward and revere mediocrity.

Problems With People

Now we come to people. I have been in

DP for 22 years. I recently applied for a job and was turned down, even though I was the most qualified applicant, because I didn't have three years of hands-on DOS experience.

This was to rebuild a sick, lousy installation that DOS probably helped achieve. IBM has this company so brainwashed that they set the job specifications — mediocrity is OK as long as the company stays loyal.

We have done this ourselves, allowed ourselves to become part of an assembly line of dolts by measuring personal success in the size of our installation or how many bits we can store on the head of a pin, not by the quality of our output.

I am going to stay in DP but do things in the manner I feel best reflects professionalism. Fortunately, some companies still recognize performance, so I do well.

What we must realize is that, in the

20-plus years of the "Computer Age," we have failed in most cases to achieve what we set out to do — use computers effectively and efficiently to solve the business and technical problems of industry. We are not giving the user his money's worth because we have made results second to becoming an art form or a science with the goal of building bigger (or smaller) machines that do things faster but not necessarily better.

We are actually at the crossroads and could well become extinct. In today's economy, who needs a bad, costly computer installation?

No Free-Standing Marvels

If we strive to be professionals, we must learn to stand up and say and do what we believe, instead of being safe and popular as we have done. We must also be realistic and remember what goal we set out to accomplish.

We did not set out to develop computers to be a free-standing marvel; they were developed to perform a vital function in our society.

The Justice Department is not our savior. IBM and the other vendors will only respond to the pressure of the marketplace, and we as the experts in the field must recommend and convince people to order the equipment to do the job.

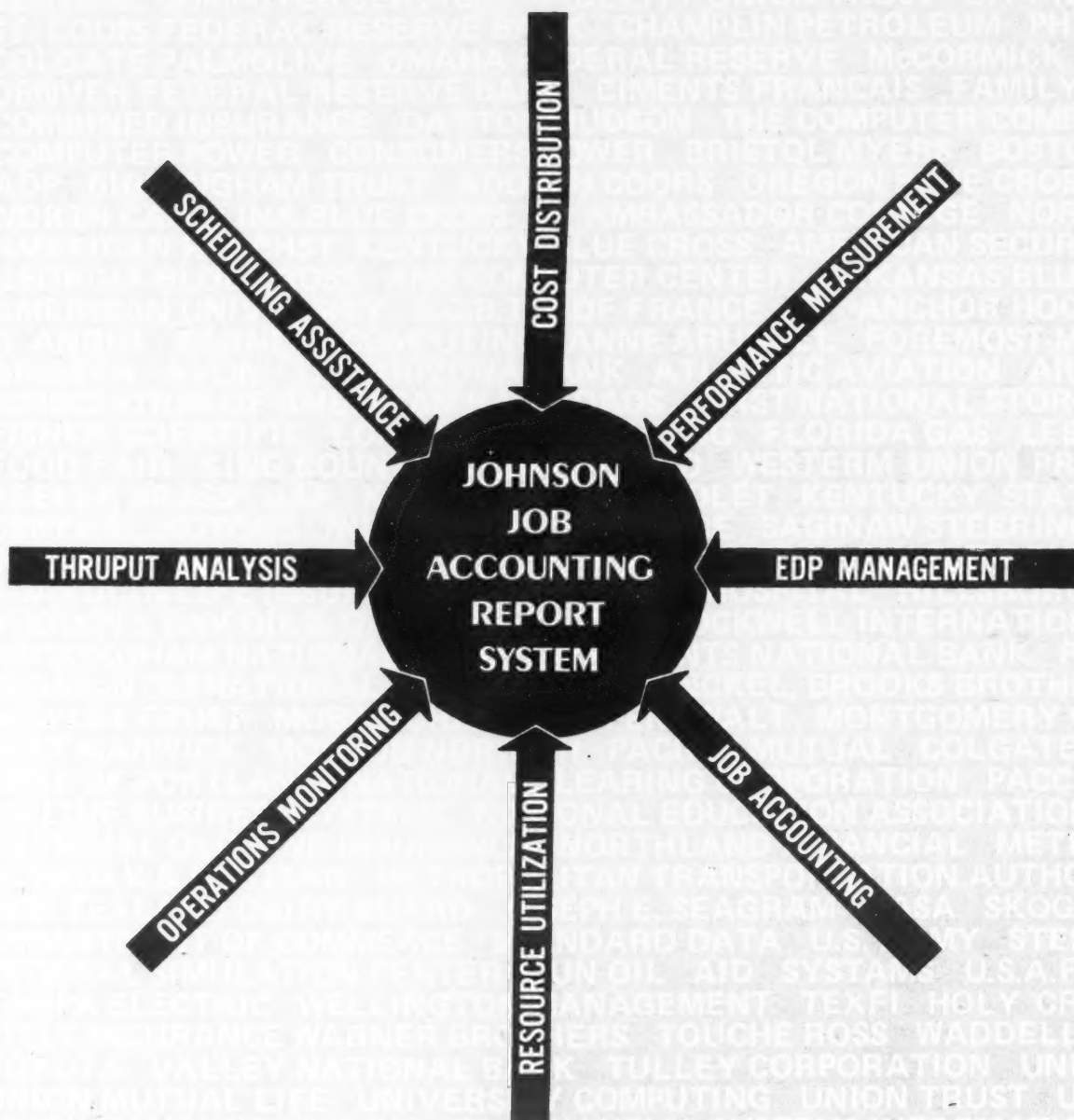
The day of picking IBM because we can't be criticized for it is long gone. Not only should we be selective, we must be demanding. How many of us would stand for buying a car that doesn't perform and happily agree to wait until next year so we can buy a new motor to make it run right?

We need one more element — a little guts. There are worse things than quitting a job if one feels things are being done wrong. I didn't mind being turned down for jobs over the last 20 years because I wouldn't join the club — there were always others.

A piece of paper does not make us professional — actions and the ability to fight for what is right are far more important. We need the researchers as well as the performers, but let's not mix them up. Let the researchers wait until their product is ready.

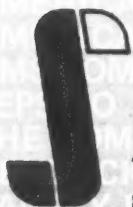
Burton Grossman is with Burton Grossman and Associates, Houston, Texas.

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Letters

to the Editor

Who Was First to Use

Dual Configurations?

I am trying to identify the earliest applications of two computers in a "dual" configuration (i.e., both machines online) for purposes of reliability. I would appreciate hearing from any readers who are aware of such systems in service prior to 1965.

K.C. Schroer

28 Bond St.
New York, N.Y. 10012

An Editorial Director?

In an answer to a letter on Page 11 of the Aug. 21 edition of *Computerworld*, it was stated that the editorial comments by Herb Grosch do not reflect the editorial policies of CW. I object to that statement.

CW has given Grosch the title of Editorial Director. That title certainly sounds like Grosch ranks above all other editors.

I can't help but believe, then, that his editorial opinions do permeate the paper and staff and do reflect the editorial policies of CW.

Fred E. Brewer

Colorado Springs, Colo.

But Watch Out for Problems

Data Bases From 'Outside' Stretch DBMS Usefulness

By Don Leavitt
Of the CW Staff

NEW YORK — "There is hardly a data base management system in existence today that could not be improved by merging its internal data with data bases available from outside sources," said Paul T. Hart, supervisor, commercial information center at I.E. duPont de Nemours.

Later in the Info '74 session that re-

'Manman' Adapted To On-Line Usage On Tymshare Net

CUPERTINO, Calif. — "Continuous and instantaneous" control over inventory and bill of materials processing is the goal of an interactive version of the Manman manufacturing management package recently installed on the Tymnet remote computing network by Tymshare, Inc.

Interaction may be direct — as in conventional "time-sharing" problem-solving — through a command file or through paper tape or magnetic tape, the vendor said.

Originally developed as a batch system by ASK Computer Services, Inc. (Los Altos, Calif.), Manman includes a perpetual inventory module. For each item in inventory, it carries part number, description, quantity on hand and costs. Minimum reorder points, economic lot sizes, lead time and quantities used period-to-date are also provided, as well as open purchase information.

Bill of materials by part number and quantities with reference indicators, and list and cost of bill of materials are generated by the system. So are indented multilevel bill of materials and where-used listings — for all parts or for selected parts.

Material requirements planning is handled by a bill of materials subsystem. All requirements are determined by a gross to net explosion level by level and are time-phased by lead time to relate both due weeks and action weeks, the vendor said.

Inventory reports generated by Manman include all information about a part, parts below reorder point and due and overdue purchase orders. Lists of all shortages, complete inventory status report of all parts and an evaluation of on-hand and period-to-date used inventory costs are also part of the system.

Data in the inventory file is stored in "very tightly packed" form, the network said, to minimize storage charges. Availability of paper tape entry should also keep costs down by allowing more efficient operations, the spokesman added.

The system is available under a royalty-plus-operating-cost plan, he noted, from 10340 Bubb Road, 95014.

viewed the availability and usefulness of these outside data bases, Joel Darrow from Morgan Guaranty Trust agreed with Hart, but warned users to be alert to problems that might be encountered in trying to work with the bases. Though the proprietors must take sole responsibility for some of the problems, others are certainly caused by the user, he added.

Robert Riley, vice-president, Chase Manhattan Bank, and provider of some of the bases under discussion, agreed with his colleagues on the panel, then gave some historical perspective by comparing

the "information industry" today with the transportation industry at the turn of the 20th century. Real growth in use of the data bases will come, but not until the end of this decade, he predicted.

Base Summary

The types of data bases currently available and the way users can work with them was outlined to the panel and the 150 people in the audience by Jay M. Gould, president of Economic Information Systems, Inc., a vendor in the field.

Abstract data bases were the first cited by Gould, who noted keyword searches

were "quite efficient" but that storage of compacted references made these bases good for browsing only. Reference to actual source data would have to be accomplished off-line.

The introduction of numerical classification codes or other symbols speeded the process since every character in the data base no longer needed to be examined. Typically, economic data bases have moved to the government's Standard Industrial Classification (SIC) and extensions, while financial data bases have gone to stock exchange ticker symbols, he said.

Also keyed to the SIC codes, in large part, are time series data bases such as those maintained by the National Bureau of Economic Research and other commercial vendors. Used in their basic form these are good for econometric studies, Gould said.

Some vendors, however, have added capabilities to add the user's own data to the information provided by the base, leading to various ways of comparing the user's performance, for example, with that of his competition. And breaking down data by location within a listed company has allowed more useful assignment of SIC codes, Gould said.

'Plain Inaccurate'

In his listing of potential problems, Darrow started by noting that data in some of the bases is "just plain inaccurate." More subtle, but just as serious in their

(Continued on Page 19)

Production Control Application Uses System 2000 as Foundation

WILMINGTON, Del. — Pics 2000, now available on the Sci-Tek remote-computing network or for an in-house installation, is an integrated production information and control system used with a free-standing data base, a library of software routines to process the data on the base and one of the better-known data base management systems, MRI's System 2000.

Pics 2000 operates with equal facility in both conversational and remote batch modes, according to Sci-Tek spokesmen. They added each system is individually generated for the user's needs and designed to allow evolutionary changes.

The system supports the traditional subsystems required for production information, including order entry, inventory control, master production scheduling and planning, plant maintenance, manufacturing activity planning and plant monitoring and control.

Related accounting functions are also included, the firm added, citing capabilities in accounts receivable, purchasing and receiving, accounts payable, order release and forecasting.

'Fluid' Interface

Sci-Tek's production information and control system differs from others, the spokesmen explained, in providing the end user a "fluid" but direct interface with the system through System 2000's inquiry and report writer features, rather than depending on the DP staff in the user's organization.

Providing this ease of use may — and probably does — impact the operational efficiency of the system, but it saves more in manpower and throughput than it costs in added computer processing time, the network claimed.

System 2000, on which the Sci-Tek effort is built, provides for the definition,

modification, administration and accessing of a data base.

Customized versions of Pics 2000 can be installed on the Sci-Tek network or on any in-house computer system that can support System 2000. The network is unable to cite a base price for either approach "because the customization needed would vary in each case."

A spokesman noted, however, that it would be up to the in-house user to acquire System 2000 directly from MRI Systems Corp. in Austin, Texas.

Sci-Tek is at 1707 Gilpin Ave., 19899.

'Univation' Measures Workers

SOUTHFIELD, Mich. — Manufacturers may be able to improve productivity by 15% or more using the Univation system of work measurement and control currently available on the Acts Computing Corp. network, according to a spokesman for the Methods Science Division of Acts.

The Univation system provides a means of analyzing "any operation" in terms of variable input to a set of universal mathematical models stored in the computer, he said. From this analysis, the system generates "very accurate" time standards and shop-oriented methods instructions.

The system also puts out a number of by-products, including routing files, cost files, functional work element files for assembly loading and balancing and for shop scheduling, input files for mass updating of standards and instructions to improve the method of handling various operations.

Basic to the use of the modular Univation system are essentially classic but extremely detailed time and motion studies of each operation that is to be monitored and controlled.

These help establish standards for the way the work is being done but also may

lead to suggestions for improving the operation, the spokesman noted.

The suggestions are generated by the system whenever production from a particular operation falls below expectations, Acts said.

The system differs from other work study software, the vendor claimed, since it is based on a Univac 1108 large enough to have all formulae and tables core-resident and therefore immediately available, rather than accessible only through retrieval from disk or other indirect storage.

In common with other computer-based work study systems, Univation cuts back sharply on the clerical work required of the industrial engineer and produces results that are not subject to the errors which creep into tedious human calculations, Acts said.

The system is accessible on the Acts remote computing network but can be installed on a user's in-house mainframe. On the net, costs vary according to usage; on an in-house implementation they will vary on the modules acquired and the amount of customization required.

Acts is a 29200 Southfield Road, 48075.

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'Wocom' Considers Mental Processes

MOORESTOWN, N.J. — The Work Study on Computer (Wocom) work measurement system developed by the Wofac Division of Science Management Corp. and installed on the GE Mark III remote-computing network more than a year ago has been enhanced, the developer said, to include a subsystem to analyze the "mental processes" required to perform useful work.

Other improvements include subsystems to support revision and updating of operation standards and standard data, interactive or batch assembly and production line balancing, as well as more extensive regressive

analysis techniques than previously available on the system.

Modules allowing use of work-factor and methods-time measurement techniques, standard data development and determination of learning time allowances, all found in the initial implementation, are still in the enhanced Wocom, Wofac said.

For job analysis under Wocom, three inputs are required: the characteristics of objects used, the configuration of the workplace and the task to be performed. It is not necessary to input individual motions, the developers noted.

The Mento-Factor enhance-

ment analyzes the "mental processes" required to perform useful work. Visual inspection, testing, proofreading, mathematics, color matching and sorting are among the processes that can be handled by this module, the company claimed.

The Wocom-Rev module provides selective updating of standards and data summaries or across-the-board revisions using work segments which also have been revised.

In addition, it also provides a test mode, through which engineers can determine the effects of contemplated changes, and a warning scheme by which standards or summaries are flagged if they have been changed by more than a specified percentage.

Under the line balancing modules, the user supplies detailed specifications on operational priorities, desirable — and undesirable — groupings of work elements and desired workstation cycle times.

The output is intended as an optimum solution which "certainly can be modified" by manual planners, Wofac said.

Wofac is on Fellowship Road, 08057.

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Road Show Touts 'Production IV'

CANOGA PARK, Calif. — Manufacturing plant personnel will be participating in a traveling, two-state, eight-day workshop intended to explore the opportunities and considerations associated with the Production IV management system marketed by Informatics, Inc.

Beginning in Los Angeles on Oct. 28 and moving to Illinois on Nov. 4, the workshop will recess Nov. 5 and 6 to permit participants to attend the International Meeting of the American Production and Inventory Control Society (Apics) being held in Chicago on those two days. Following the Apics meeting, the workshop will reconvene in Chicago for the final sessions Nov. 7 and 8.

Varied Menu

Consisting of a mix of formal lectures, individual assignments and group discussions, the workshops will provide the opportunity for Production IV users to receive information and recommendations from other users whose systems are in similar stages of development, and from Informatics Industrial Systems Division consultants who will be conducting the workshop.

The program covers a review of Production IV modules and project planning and management discussions. Informatics Production IV consultants will be available to assist in solving specific installation problems and offer suggestions that will result in more effective utilization of the system, a spokesman said.

On Monday, Nov. 4, the workshop will meet in Illinois to inspect a current Production IV installation.

An attendance fee of \$500 includes workshop materials, lunches for the eight-day period, a get-together party for participants and a workshop dinner.

Informatics is at 21050 Vanowen St., 91303.

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TITLE/OCCUPATION/FUNCTION

- 11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/
Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
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Registers Servicing Abends Key To System Interrupt Debugging

Debugging OS system interrupts involving Open, Close and End of Volume (EOV) routines is a chore for many programmers. In an earlier article [CW, Sept. 11], Lewis Copley showed the relationship between various control blocks and request blocks and described how those links can lead to identification of register contents that would be useful in debugging the system interrupts.

In this article, he outlines where those registers can be found in an Abend dump and what they mean to the user.

Concepts and Techniques

By Lewis L. Copley Jr.
 Special to Computerworld

When a system resource is invoked via the SVC facility, the called load module makes the assumption that the registers, at entry, contain the necessary pointers to the control information needed to provide the requested service.

The registers at entry to the Open routines contain the required information for Open to execute; the registers at entry to Close contain the necessary information for Close to execute; the registers at entry to EOV contain the mandatory pointers for EOV to execute.

The registers at entry to Abend exist for the express purpose of satisfying the Abend request; the fact that a register at entry to Abend may contain a pointer to control information used by a previous load module is not predictable.

A comparison of the registers at entry to Abend with those of the abending EOV routine is illustrated in Figure 1. The smart analyst, when confronted with

a debugging situation, will utilize the registers connected with the RB that issued the Abend request (PSW interruption code of OOOD).

Once the analyst has determined which registers to use, the following methodology can be used to locate the ddname with assurance.

Register 1, at entry to the Open or Close routine, contains an address pointer to the parameter list being passed. This parameter list, composed of a variable number of full-word entries, supplies the Open and/or Close routine with the address(es) of the DCB(s) requesting the service. Each full-word entry has the following format:

Byte 0 — option byte
 Bytes 1-3 — DCB address

The analyst can easily determine the number of DCB entries contained in this parameter list.

The option byte for each full-word entry in the list should be tested for a high-order bit value of 1. If present, it signifies that the following DCB address represents the last DCB for which the Open or Close function is requested. If there is only one entry in this parameter list, then the DCB address associated with the abending SVC is in the low-order three bytes of the entry.

If, however, there is more than one entry in the parameter list, the analyst should interrogate the DCBOFLGS for each of the DCBs in the list to termine whether the requested service was successfully completed. The DCBOFLGS field can be located by adding the hexadecimal offset of 30 to the address of the DCB.

(Continued on Page 19)

Breaking the Input Bottleneck with Key-to-Disk

How to evaluate and optimize the most common successor to keypunch equipment.

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Course Leader is Lawrence Feidelman

Free Copy of "Data Entry Today" to all participants.

Data Entry Today is Management Information Corporation's authoritative publication covering every aspect of data entry. It will be part of your course material and will serve as a valuable continuing reference.

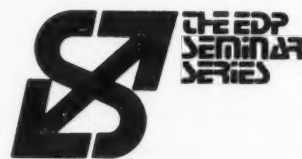
Who should attend

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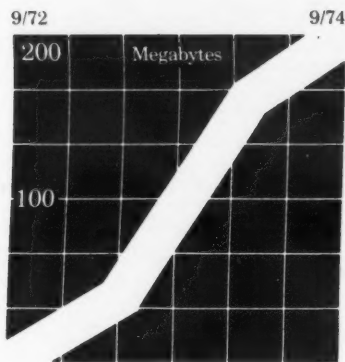
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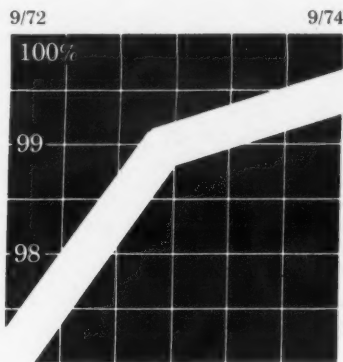
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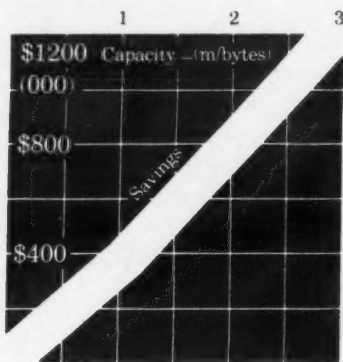
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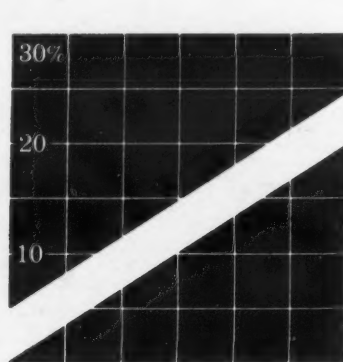
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Registers at Entry to Abend No Help in Debugging

(Continued from Page 16)

Once the one-byte DCBOFLGS field has been located, bit 3 (the fourth bit) should be inspected:

- A value of 1 indicates the DCB has been successfully opened.
- A value of 0 indicates the DCB is not open.

Obviously, if the Close SVC was processing at the time the error was detected, the offending DCB is that one whose DCBOFLGS indicates the open status. Conversely, if the Open SVC was processing at the time the error was detected, the offending DCB is that one whose DCBOFLGS indicates the closed status.

EOV Case Simple

Locating the offending DCB if the requested SVC was for EOV functions is quite easy. Register 1, at entry to the

'Outside' Bases Aid DBMS Use

(Continued from Page 13)

impact on the user, are the inconsistencies and incompatibilities that show up on some bases, he said.

The inconsistencies apparently occur because of inadequate file updating, leaving discrepancies in what should be identical data stored on different record sets. By contrast, incompatibility refers to data differences between files, when all indications are that the data should be identical.

In most cases the problem of incompleteness of data is out of the hands of the base proprietor, since the definition of how well the available data fits the user's needs is obviously in the hands of the user. Likewise, the claim that data is unrepresentative is really a special case of incompleteness, and again the solution lies in the hands of the user, Darrow said.

The charge that generated output is unwieldy might be laid against the vendor if facilities are not provided to let the user control the output, or to the user if facilities available are not used.

Whether use of an external base is too costly — another problem some users feel they have — depends on how the cost compares with the benefits accrued, Darrow noted. Many of the bases are extremely expensive, he admitted, but if they add substantially to the attainment of the user's objective, they have to be considered cost-effective.

If, on the other hand, a really low-priced base provides the user with no measurable advantage, it's a poor investment, he said.

The timeliness of data on an external data base is another problem for users, Darrow said, and another area that has to be judged subjectively. Data fresh enough for evaluation of a trust account, for example, might be hopelessly out of date for the determination of what margin requirements to demand of a customer waiting to buy stock, he pointed out.

Govt. Shipping Specs Produced by Package

LARCHMONT, N.Y. — Documentation that "satisfies all current government specifications" dealing with procurement for Army, Navy and Air Force contracts can be generated with a 32K IBM-oriented Cobol package, according to the vendor, Ronconi Data Services, Inc.

The system is parameter-card driven and includes a "preview" stage so both engineering and publication personnel can be sure everything is included before the actual production of the documents.

Written in ANS Cobol, the 36-program system can be purchased for \$20,000 from Ronconi at 615 Fifth Ave., 10538.

EOV routine, points to the DCB requesting the service. The above methods for locating the offending DCB, in the event of abnormal end associated with Open, Close and EOV are reliable.

Once the offending DCB has been located, the ddname can be readily established using one of the following methods:

The PCP/MFT user can use the first method indicated by Harmon Feig [CW, Aug. 7] — i.e., compare the DCB address to those DCB addresses listed in the ddname table, located in the edited control section of the dump, until a match is found. If no match is found, the following method can be used.

• MVT users are not blessed with the convenience of the ddname table found in the PCP/MFT dump. To locate the ddname the analyst should locate the DCB's Task I/O Table (TIOT) offset. This can be accomplished by adding hexadecimal 28 to the DCB address.

Once located, the analyst should sub-

SVRB 02E0D0	TAB-L1 00130400	APSW F5F5F1C4	WC-SZ-STAB
	00000000	MT-LNK 0002E8D0	
(A)	RG 0-7 0013A306	001209CC	001209CC 0
	RG 8-15 00170A30	00170000	00120686 0
	001209CC	4007F839	001388F7 0
	001209CC	40000000	0013A306 0
REGS AT ENTRY TO ABEND			
FLTR 0-6	0002CF2800000000	0602C05910000000	
REGS 0-7	00000000	00001000	001209CC 4000F25F
REGS 8-15	0002E0D0	000200A8	58000040 40008064

Contents of registers servicing Abend are listed under affected RB (as at A above) and are clearly different from the contents of registers at entry to Abend.

tract hexadecimal 4 from the DCBTIOT. The remaining value can be associated with the TIOT provided in the dump listing as follows:

- 14 represents TIOT entry 1.
- 28 represents TIOT entry 2.
- 30 represents TIOT entry 3.
- 50 represents TIOT entry 4.

Each occurrence of hexadecimal 14 represents an entry in the TIOT. As soon as

the entry number is established, it is an easy matter to count down the indicated number of TIOT entries and extract the ddname.

The above methods for locating the offending DCB and ddname for those system interrupts are preferred because they assure the analyst that the desired information will be found accurately and quickly.

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SYSTEMS & PERIPHERALS

Mini World

Dual-Drive Floppy System Offered For HP 21XX Mini

SUNNYVALE, Calif. — The Model HPC-420-2 dual drive floppy disk and disk operating system from Dicom Industries operates with Hewlett-Packard 21XX Series minicomputers. The key feature of the system is the inclusion of the Dicom DOS-M system disk driver (DVR31) in the HP 24225 Rev F version of DOS-M, the company said.

The disk driver for the HPC-420-2 can operate with or without DMA, making it the only system which can be used with any HP 21XX series computer, the firm said.

Basic system configuration is any HP 21XX series computer, the Dicom HPC-420-2 FDOS and a console device. An SIO/BCS FDOS is also available, which provides the non-DOS-M user with a disk-based operating system.

The HPC-420-2 is priced at \$4,900 from the firm at 715 N. Pastoria Ave., 94086.

Floppy Disk System Has Oval Sector Buffers

ROCHESTER, N.Y. — The Sykesdisk 7150 floppy disk system from Sykes Datatronics, Inc. has dual sector buffers that permit connection of the disk to unbuffered devices which transfer data asynchronously.

When connected to a mini, the disk is said to be capable of operating at any priority level and does not require an I/O area in computer memory.

The controller performs sector search, track sequencing, record blocking, generation and check of IBM sync, address verification prior to reading and writing every sector, head unload and bootstrap.

Diskettes are IBM-compatible and mini-computer interfaces are available, the company said.

The 7150 is priced under \$3,000 from the firm at 375 Orchard St., 14606.

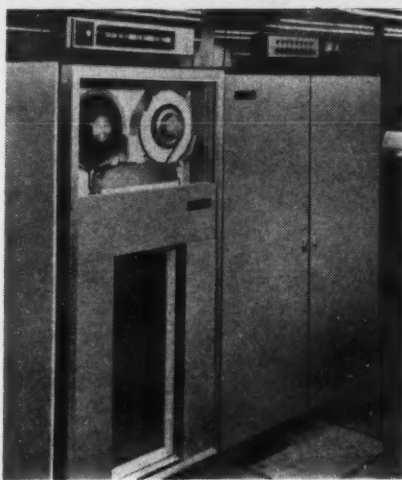
Paper Tape Reader for PDP-11 Places Controller in Mini

FULLERTON, Calif. — A paper tape reader designed by Wilson Laboratories, Inc. for Digital Equipment Corp.'s (DEC) PDP-11 utilizes a controller board that replaces the DEC terminator resistor inside the PDP-11.

The system contains a fanfold box that also handles paper tape rolls.

The reader assembly with the fanfold box installs in a standard 19-in. rack. Drive speeds of 80- or 100 char./sec are available.

Complete system prices start at \$1,250 from the firm at 2536-D E. Fender Ave., 92631.



Formation's Tape Drive for Honeywell's Series 200 and 2000

3420-Type Drives Interfaced To Honeywell 200, 2000 CPUs

CHERRY HILL, N.J. — Users of Honeywell 200 and 2000 Series CPUs can get IBM 3420-type tape drives from Formation, Inc.

Using Telex-supplied tape drives, Formation has designed a plug-compatible Honeywell-equivalent tape format modes in addition to Honeywell 6000 compatibility and 9-channel Ebcidic and Ascii formats.

The drives are the standard Telex models, comparable to IBM's 3420-3, 3420-5 and 3420-7, with speeds ranging from 70- to 150 in./sec. Formation does not use the 200 in./sec full capabilities of the largest drive because the data rate acceptable by the Honeywell CPUs cannot easily handle it, the firm said.

GP-100 Digitizes Color Images

BROOMALL, Pa. — The GP-100 graphics processing system from Broomall Industries, Inc. is a self-contained system for digitizing and image-processing maps, drawings and photos in processing times "as fast as 30 seconds per document," according to the company.

The GP-100 can digitize and reproduce colored images and documents up to size D, the company said. The system permits

'Dyna-Myte' Shakes CPU, Gives Performance Reports

By Vic Farmer
Of the CW Staff

ROCKVILLE, Md. — The Dyna-Myte computer performance monitor from Compress, Inc. is the smallest and least expensive monitor the company has offered.

Priced at \$7,000, in a minimum configuration the system has 16 high-speed counters, 12 sampling counters, 20 probes and a bar graph display.

The bar graph display provides a method of displaying the contents of the 16 counters as a percentage of a selected time base.

Data can be accumulated through an optional 7- or 9-track tape drive for further analysis by a computer using a Dynapar software support package.

In addition to the standard parameter summary reports, counter summary reports, system utilization profiles and histograms available to users with Dynapar, the system may also be used to test job stream combinations dynamically with jobs on line and, as a hardware diagnostic tool, to zero into peripheral problems, the firm said.

Additional displays can be attached to display more parameters.

With the monitor, data is collected from the host system through the probes, processed by user-defined logic on the unit's 200-hub plugboard and stored for display and distribution.

A numeric display permits the display of count values.

Up to 10 Dyna-Myte monitors may be configured through a bus arrangement to form a full system. Eight of the monitors may be accumulating or recording data simultaneously while the remaining monitors are acting as remote display units for any of the active monitors, the company said.

The heart of the basic monitor is the systems microprocessor through which the monitor accumulates both count and time values in its accumulators. The 16 accumulators are maintained in a 32-word (24-bit) random-access memory.

For count accumulations each occurrence of a measured signal transition is noted and aggregated in plugboard-specified counters. Events may be accumulated in the unit's counters as often as 100,000 times per second.

Time events can be sampled in a time-base period at fixed intervals between one second and four hours. At the end of the time period the contents of the counters can be displayed or transferred to tape.

The firm is at Two Research Court, 20850.

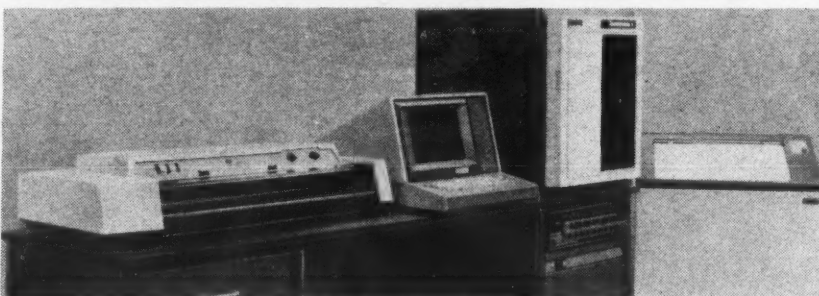
Interface Manual Explains IBM System/3 I/O Structure

WOODLAND HILLS, Calif. — An interface manual describing the I/O structure of the IBM System/3 is now available from Compata, Inc.

The manual presents technical information not available elsewhere, since IBM does not publish System/3 interface descriptions, Compata said.

Information includes signal descriptions, timing considerations, pin numbering, voltage levels and physical cable layouts, as well as tips and precautions.

Price of the System/3 interface manual is \$5,000. Compata is at 6150 Canoga Ave., 91364.



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As a matter of fact, RDOS is so easy to use that anyone who's ever worked in FORTRAN should be able to develop programs with it.

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Human Considerations Important In Choosing Right DP Equipment

NEW YORK — Selecting computer equipment is "highly individualistic" within the constraints of using companies. Even the color of equipment could play a role, Marvin Silverman, manager of systems planning for The Chase Manhattan Bank, told an Info '74 session here recently.

It's easiest to judge equipment on price alone, he indicated, but this might not always be the best way.

For example, he said, human characteristics need to be taken into account. If the operators or others don't like working with a certain piece of equipment they might use it inefficiently.

Another factor is the reliability of the equipment and the availability of service.

Furthermore, the user should consider such environmental and functional factors as size, cabling requirements and air conditioning.

On a deeper level, users should consider flexibility, Silverman said.

For example, a user tied into long-term leases might have made the right decision financially at the time of the commitment, but he loses flexibility as new systems are announced.

This could cost an organization quite a bit, he suggested, if its best systems analysts and programmers leave to work for an installation that has the latest in equipment and techniques.

The decision on equipment is tougher today, he said, since there is a great deal of competition in the business, but this in itself creates some difficulties, he said.

When a user decides on a product from someone other than his mainframe vendor, he also has to expect the mainframe vendor to react in some way to the competition with new products or prices, for example.

Almost all these factors, he said, are intangible and therefore hard to sell to top management, but they should all be considered if the user is to make the best decisions possible.

Mini-Based T/S for Business Use

MAYNARD, Mass. — Digital Equipment Corp. (DEC) has packaged a minicomputer time-sharing system for business users around its PDP-11/40.

Starting at \$54,000, it is priced lower than any previously available family models, DEC said.

Called Datasystem-535, the system gives "starter" users a business system with capabilities for four-user on-line processing and communication to remote computers.

The standard configuration of the system has 96K bytes of core memory, two RK05 2.4M-byte cartridge disk drives, the

CTS-500/E commercial time-sharing software, a Decwriter LA30 console terminal and provision for up to four VT05-type CRT terminals.

Printer, Tape Support

The 535 will also support a 300 line/min printer, magnetic tape and IBM 2780-compatible communications.

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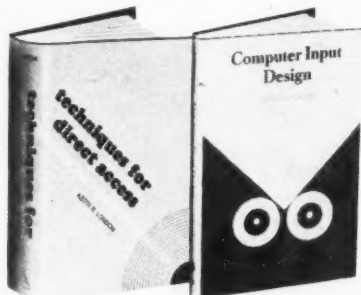
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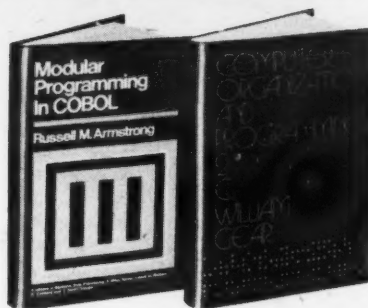
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'Justification' Complicated Honeymoon Over for POS, Merchants

By Toni Wiseman
Of the CW Staff

NEW YORK — The glossy veneer on point-of-sale (POS) has tarnished a bit, if a session at Info '74 is any basis for judgment.

In a session entitled "Point-of-Sale Systems: The Issues, Cost Justification and Long-Range Effects," speakers generally agreed that while POS is a boon to the supermarket business, it must be evaluated much more carefully than it has been so far. And for the retail merchant, one speaker at least could not see any reason for installing electronic systems.

"POS has been referred to as the retailers' dream come true," said Richard Shaffer, vice-president, Gambit Management Strategies, Inc. "But it can also be a nightmare if you don't look at it carefully."

In terms of cost justification, he said, many factors must be considered above and beyond the initial cost of the terminals. Maintenance, for instance, can run between 5% and 8% of the purchase price.

Choosing a terminal is also more difficult than it seems, because the least expensive vendor is not always the best for an installation.

One point to consider is whether a vendor will allow for quantity discounts. Many allow discounts on terminals and some on wands, ranging from a 10% discount with NCR to 8% with Singer or Unitote. None, however, gives discounts on controllers, he said.

Marketing policies should also be closely scrutinized, Shaffer noted. Is application software available? Is credit authorization provided? Is the software bundled?

What kind of trade-in allowance on mechanical registers will the vendor allow? Can you get some kind of maintenance allowance on late delivery? Will the vendor write your training manuals? What kind of systems engineering support will he provide?

"Ultimately, the cost justification for POS comes down to tying the devices or information gathered into as many systems as possible," he said, since the hard savings amount to approximately 1% of sales.

Buried Expense

While praising the benefits the registers accrue for supermarkets, Richard Shulman, corporate director, management information systems, Pueblo International, Inc., emphasized the buried expense of the system.

It would cost \$250,000 to test one store for six months, he said, and that figure does not include salaries, but only support equipment, basic programming and systems design.

"We're afraid as an industry that our executives aren't ready or prepared for all the reports we can generate," he said. "The change must be evolutionary, not revolutionary."

Shulman noted that one manufacturer is promising the availability of 132 new reports. But, he said, "The supermarket manager doesn't have time to read one report, much less 132."

"The before and after of POS should be looked at, but there is

no after," stated Howard Davidowitz, director, S.D. Leidesdorf and Co. "And that is because people have forgotten why POS was developed."

The reason for POS was better return on inventory investment, he said, since credit authorization was already available, and in a retail store, as opposed to supermarkets, faster throughput means nothing on the bottom line.

With POS the retailer can get integrated unit/dollar information instead of collecting it from

two or three different sources. But, he said, the final report the buyer will get is the same as he has been receiving for the last five years.

"Only one person has to change, the data processing manager. Instead of having 10 people working for him he now has 30."

Shulman summed up the general attitude of the speakers with the comment, "no amount of expense can compensate for a basically lousy system. Don't goldplate a tin idea."

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Micros Can Provide More Flexibility for Less Money

By Dr. Leroy H. Anderson
Special to Computerworld

The major benefit of using a general-purpose computer to control a numerical control system is it permits new features to be easily implemented by changing the software.

General-purpose computer applications have two general areas: direct numerical control (DNC), where a large computer works as a controller for more than five machines, and computer numerical control (CNC), where a minicomputer controls one or two machines.

Between DNC and CNC, CNC is preferred since it's flexible. Large computers are expensive to own, and if the computer breaks down all machines it controls will be down. Microcomputers, on the other hand, are less expensive, and if the microcomputer is down only one or two machines that are connected to that controller will be affected.

The typical microcomputer system can be divided into five basic units. They are

a microcomputer and interface modules, machine language programmable read-only memory (Prom) programming equipment, a high-level language compiler for Prom programming, a program analyzer and a system tester to allow the user to test the microcomputer and the memory and interface modules.

Six Modules

There are digital, power-switching, analog, communication, peripheral equipment and special interface modules. The digital modules allow the user to have the microcomputer system digital input and output lines.

Power-switching modules allow AC or DC input and output to be interfaced to the system.

There are usually several analog modules, including a 16-channel solid-state analog multiplexer, an 8-channel solid-state differential multiplexer, an 8-channel differential flying capacitor multiplexer, analog-to-digital (A/D) convertors

and digital-to-analog (D/A) convertors.

Data communication modules allow the microcomputer to talk to other computers. Serial asynchronous communication, serial synchronous and parallel data communication modules are generally available.

Paper tape readers, paper tape punches, magnetic tape cartridges, card readers, disk memories, 6-, 8-, 16- and 32-digit displays, alphanumeric printers and 16 keyboards are all possible peripheral equipment.

Pulse accumulator, internal timer and quadrature encoder modules come under the classification of special modules.

Machine language programming is the most efficient of the two methods to program the Prom.

The main benefit of dedicating a microcomputer to production machinery control is increased operational flexibility, since the entire system becomes programmable. With a microcomputer control system, it is practical to build multifunc-

tion machines because diverse tasks can be performed under the command of the controller.

An economic advantage is possible if one such machine can be used where several were previously necessary.

In addition, programming may allow complex equipment to be modified for new production requirements rather than fall into obsolescence.

The microcomputer is a programmable remote station which can be addressed from a central computer and be given operating setpoints or strategies or can send data from a number of sensors and then implement decisions based on complex combinations of conditions.

In addition, distributed digital processing permits the central controller to receive refined status reports rather than raw data from remote stations. Since information is then exchanged only when established limits are exceeded or when remote units are specifically interrogated, communication burdens are reduced.

This can save money by reducing the complexity of the central computer and programming and decrease the wiring or line cost by having each remote unit do more. Data can also be stored, timed and dated at a remote site by using data storage peripheral units such as magnetic tape cassettes.

Local control has long been accomplished using traditional elements such as relays, timers or counters. However, where specialized functions are to be performed, the costs associated with development of electromechanical controllers can exceed those required to implement the microcomputer.

Thus, overall efforts can be reduced considerably by using standard general-purpose modules which can be programmed to meet the needs of individual systems.

Anderson is president of the Comstar Corp. in Edina, Minn.

Manufacturers Facing Increased DP Costs In Conversion to UPC

NEW YORK — While the Universal Product Code (UPC) has been heralded as a great advance to the supermarket industry, manufacturers, faced with the problems of marking the products, have a somewhat rocky road ahead, a Ralston Purina Co. executive told Info '74 attendees recently.

The UPC is the black and white bar symbol scanned by electronic point-of-sale (POS) systems.

There are four key steps in converting to the code, David Lighthall said.

First of all, the manufacturer must look at all his extant product codes and convert them to the 10-digit code prescribed by the Universal Grocery Products Code Council (UGPCC). "These codes must be set internally," he said, "which takes about a year."

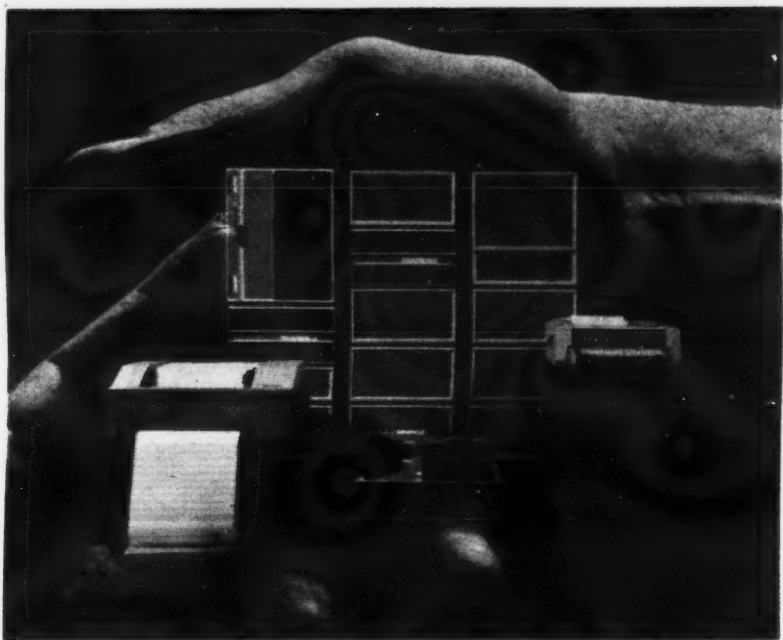
To complete this conversion, the manufacturer uses the unique five-digit code assigned to him by the UNGPCC, and then adds five digits of his choice to describe the particular product.

In most cases, Lighthall confided, there is no logic to the last five digits. They tend to be randomly chosen.

Secondly, the manufacturer must revise his shipping containers, a process which can take six to nine months. As more and more warehouses and receiving operations become automated, containers as well as products will have to be source symbol marked, he said.

The third step is to inform the customer or store of the new code, either by a computer printout or with a printed code reference booklet.

After the customer has had this code for two or three months, documents such as invoices can begin to show the UPC. It is at this time that products can begin to be source symbol marked, he said.



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A Computerworld Special Report
September 25, 1974

Computers in Manufacturing



Computer-Aided Manufacturing: A Quiet Revolution

By Robert T. Lund

Special to Computerworld

With very little conscious awareness of the potential consequences, manufacturing technology is moving quietly toward the industrial revolution of computer-managed manufacturing.

In virtually all of the high-technology countries, the results of almost a decade of industrial, governmental and university research are beginning to appear on the production floor.

Computer-based automation is drastically changing the way things are made and the jobs of people who make things. Stimulated by the prospects raised by these early attempts, the pace of development in many places is quickening.

Some of the reasons for the growing interest in computer-managed manufacturing are purely technical. Processes have become so complex, so haphazard, or operate at such speed that humans can't process the information and act effectively. The problem is obvious when an event takes place in a fraction of a second, but it is equally true when a complex series of events must be reduced from 10 weeks to one.

A metalworking job shop is a good example. If one relied solely on human communication, memory and labor to process the hundreds of batches of parts in a job shop, delivery times of a few days would be impossible.

But with the proper combination of computer control, handling and processing technology, it is indeed possible.

Strong Economic Pressures

The economic pressures for computer-based manufacturing technology are strong, as reflected in the intense interest shown by some governments in supporting development work.

The economic strength of many of the developed countries is increasingly dependent on international trade, and competition between producing countries is a natural consequence. Countries such as Japan, The Netherlands, West Germany and the Scandinavian countries recognize this and are subsidizing the development of new manufacturing technology at rates that seem enormous by U.S. standards.

From a competitive standpoint they are seeking two advantages: lower product costs and faster response to market opportunities.

Another economic factor is that while computers have increased substantially in power and in reliability, their cost has fallen rapidly. It is not unreasonable now to consider equipping individual machines with minicomputers; the cost alone would have been prohibitive ten years ago.

The high cost of capital in all parts of the world puts a premium on utilization of equipment and inventory investments. Computer-controlled systems often bring

major increases in machine productivity. This is not just because computer-controlled machines don't need coffee breaks or lunches.

Computer controls encourage the design of processes in which the machine is actually doing useful work a much larger portion of the time. Once developmental costs have been amortized, the effective costs of computer-managed manufacturing technology should be less than the cost of equivalent new capacity using conventional technology.

Impending shortages of materials are causing industries to seek processes that reduce the losses occurring in manufacture. The elimination of scrap due to spoiled work, a reduction of trim and chips and the substitution of noncritical materials are becoming goals in many industries worldwide.

Many countries have also been experiencing severe labor shortages. Germany and Sweden now have many foreign workers, which is causing increasing social problems. Japan, unable to import labor, has been striving to free labor through more productive technology. In this environment, resistance to technological change is minimal and the incentives are positive.

Labor in the U.S., while not in short supply, is providing another type of incentive. The growing disaffection of workers toward repetitive, monotonous, dirty or disagreeable work has created localized labor shortages in the midst of labor surpluses. This has encouraged manufacturers to eliminate these jobs by automation.

New protective laws, such as the Occupational Safety and Health Act (OSHA), also have encouraged manufacturers to eliminate hazardous jobs by automation. One example is in the feeding of punch presses: OSHA forbids the presence of an operator's hands in the pinch zone of the press. Programmable robot material handlers have been one answer to the problem.

Negative Factors

Not all the factors influencing the development of new manufacturing technology are positive. The barriers to progress are formidable, particularly in the U.S. One of the strongest deterrents here is the inability of industrial firms to cooperate to the extent that seems to be required.

Developing computer-based automation for general application is a large task

calling for a great amount of talent and long-term commitments of development funds. None of the firms who normally design and build manufacturing machinery are large enough or financially strong enough to support major development programs alone.

Several machine tool manufacturers have individually made the attempt in the area of computer-managed parts manufacturing but were unable to carry their ideas through to the marketplace after spending millions of dollars.

Industrial cooperation is not only discouraged by traditional competitive attitudes but is also frowned upon by the Antitrust Division of the Justice Department.

The degree of financial risk in developing the new technology is great. Federal R&D funds for this purpose are fragmented, short-term and very small—more so than in either West Germany or Japan. There are no financial incentives such as low-interest loans, nor are there financial cushions such as fast write-offs if projects fail to be commercially viable.

Gauging the Future

If these are the factors influencing the growth of computer-managed manufacturing technology, what will the future hold?

Computer-managed assembly presents a difficult challenge, particularly for low-to medium-volume assembly. We can expect to see prototype or demonstration techniques in industrial settings within the next five years, but present laboratory techniques are a long way from practical industrial application.

These new manufacturing methods will make substantial changes in our way of life. Greater industrial productivity could mean much higher standards of living, or it could mean fewer jobs, as happened in the "green revolution" in agriculture. Industrial firms should be able to respond more rapidly to market demand because of shorter design lead time, manufacturing make-ready and production throughput time.

There are real opportunities for eliminating dehumanizing and harmful jobs, but the designers of the manufacturing technologies must be aware of those opportunities and take care to design the processes for the people who will be operating them.

From a broader perspective, the forthcoming changes are likely to modify the structure of some industries, particularly the supplier-user relationships in the discrete product sector. An even more global view would suggest that those countries which are successful in linking the power of computer systems to their industrial processes will be the industrial leaders after the new industrial revolution.

Robert T. Lund is with the Center for Policy Alternatives at MIT.

The Shifting DP Center

By Patrick Ward
Of the CW Staff

With the trend to distributed or hierarchical computer networks, factory computer systems are beginning to tie into the corporate DP shop's accounting systems through shared factory data bases.

The goal of these integrated factory data systems, according to Dr. Joseph Harrington, a consultant with Arthur D. Little, Inc. and author of *Computer Integrated Manufacturing*, is tighter control so management can spot bottlenecks, fill and ship orders quickly, and cut inventory costs.

How will this trend affect DP centers in industrial firms?

For one thing, it means they should be taken out of the accounting department's jurisdiction and become separate organizations reporting to top management, Harrington stated.

Otherwise, he said, the two user areas would be unfairly contending for DP services.

The industrial firm's DP staff will find dedicated CPUs appearing throughout the company, Harrington commented. It must plan the choice and use of this equipment in case it later becomes desirable to interconnect these subsystems.

Putting in CPUs haphazardly as

patch on the problem is no solution over the long run, Harrington added.

It remains the manufacturing manager's responsibility to come up with a computer system that meets his needs, according to M.L. Golladay in *Manufacturing Management Systems*.

The manufacturing manager determines "whether a system is needed, and, if so, [sees] to it that the needed system gets introduced," he wrote.

On the advice of computer specialists, the manufacturing manager should also formulate the system's "objectives/costs... both in the design stage and when it's operating."

The systems manager brings together the technical resources to accomplish the goal management has agreed on and also has to insure an interface exists between the manufacturing people and his own analysts and programmers.

He "should have a foot in both worlds," Golladay commented.

Later on, the systems manager should maintain a continuing technical service to keep the manufacturing system effective. This includes technical advice, monitoring and controls.

But probably one of the greatest services the systems manager can render, Golladay said, is to be "a source of creativity and innovation."

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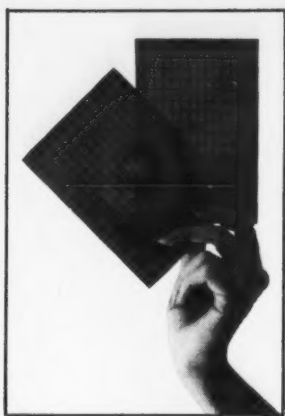
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Self-Contained Machining System Modifiable for Different Tasks

MILWAUKEE, Wis. — Two minicomputers at Allis-Chalmers' tractor plant here direct an automated machining system that takes in rough power train castings and produces machined parts ready for the assembly line.

Called the flexible manufacturing system (FMS) because it can be modified for different tasks, the self-contained machining system consists of two rows of machines that are connected and surrounded by loops of a towline recessed in the floor.

At the entrance to the 30,000 sq-ft FMS area, operators clamp the raw parts to be machined onto fixtures which hold them, put the fixtures on identical pallets and load the pallets on the carts which the recessed towline pulls through the FMS area.

The computer system then takes over, moving the carts around as if they were part of "a miniature railway system," according to Vincent Stromei, manager, manufacturing engineering, Agricultural Tractor Division.

The system, under computer control, shifts the carts from machine to machine during the manufacturing process or sends them to "sidings" for waiting periods.

Coded dots on each pallet allow the

machines to verify each pallet's identity.

One of the two 64K Interdata Model 70 computers handles the material handling system, the other the machining operations. Both are under Interdata's real-time operating system (RTOS).

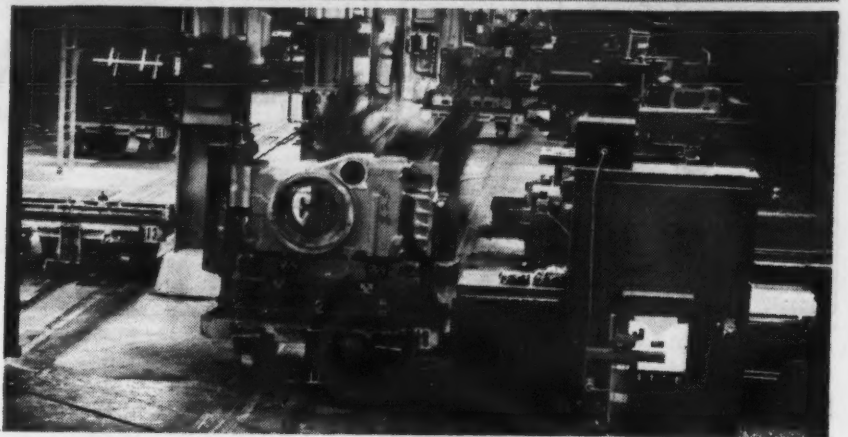
Kearney & Trecker Corp., who designed and built FMS, modified one machine's RTOS into System Gemini, a proprietary software package for direct numerical control.

The other machine is running under Kearney & Trecker's FMS proprietary software.

The configuration includes 2.5M bytes of fixed-head disk, magnetic tape, three teletypewriters, a Potter 3000 line printer, three TEC CRTs and 13 Kearney & Trecker data entry devices.

There is one data entry device for each of the 10 numerical control machines. They allow for operator intervention and can provide for running a machine under tape control if the link to the computer goes down, Wayne Case, project engineer, explained.

The material handling computer acts as the system master computer. It keeps track of the progress of parts by signals received from recessed limit switches in the towline between cart zones. These



This computer-controlled cart at Allis-Chalmers' Milwaukee tractor plant shuttles parts from machine to machine on a recessed towline during the manufacturing process.

verify the progress of each cart.

The computer limits one cart to each zone, raising stops to halt a cart or lowering stops to drop the tow pin into the continuously moving towline.

Part of Plant Project

The installation of the machining system was part of a plant improvement project related to two new tractor designs.

Plant changes involved the addition of 51 pieces of new production equipment, including 10 machining centers and duplex indexers in the FMS, and a major rearrangement of production facilities.

Stromei said Allis-Chalmers looked at several alternatives before it began ordering equipment for FMS in late 1972.

The chief advantage of the system finally chosen is its flexibility, he noted. "We can make a variety of parts, adjust to engineering changes and even machine a different type of product with a minimum of tooling changes," he said.

He noted that Allis-Chalmers had to order slower, less dedicated machines to obtain the desired flexibility for FMS. These machines, however, can handle the volume planned for the system, he added.

As technical pioneers, Stromei conceded his group has had to go through a "long learning curve," but added "we don't have any regrets on the decision" to move to FMS.

This special report was prepared by Patrick Ward, a Computerworld staff writer.

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Uses Hierarchical Concept**Testing Carburetors With Mini Can Be a 'Real Gas'**

ROCHESTER, N.Y. — The Rochester Products Division (RPD) of General Motors Corp. has added new credibility to the hierarchical or distributed concept of computer organization by putting it to work in an expansion of RPD's carburetor flow test system.

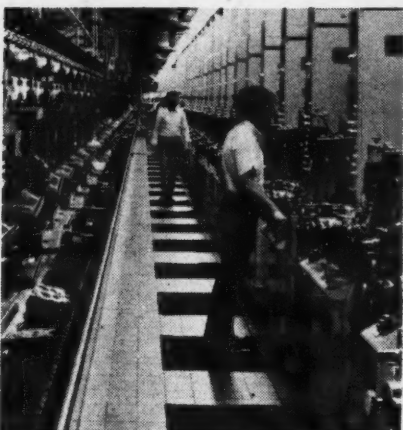
Until recently, the more than 23,000 General Motors carburetors produced here each day were tested and adjusted for optimum performance at 129 test stands, all controlled by a single General Electric PAC 4060 processor. As production needs grew, however, expansion of the test facility became a necessity.

With 129 test stands reporting to it, the existing computer was throughput-bound and could not be expanded economically to accommodate greater production.

Rather than add another large processor, RPD engineers took the opportunity to apply the distributed concept in which several minicomputers report to computer-controlled data concentrators which, in turn, feed information to and accept orders from a large-scale processor at the top of the hierarchy.

"In theory, such an organization would provide a more flexible test stand operation while providing a better data base and a limitless variety of tests," said Larry Barnes, staff production engineer in RPD's computer systems engineering group.

"It also would free the large-scale processor for program development and software testing. And in practice that's what we've achieved," he added.



Lining the walls are some of the 129 minicomputer-controlled flow test stands which will perform 18 to 20 tests.

Enclosed in each new carburetor flow test stand is a General Automation SPC-16 minicomputer. These test stand computers report in groups of 31 each to an IBM System/7 supervisory computer which acts as a communications concentrator for a 370/145 at the management level.

Each System/7 also has two disk drives for information storage in case the 145 goes down. The system has even been designed so it can operate when the System/7 is down, the key being the SPC-16 inside each test stand.

The minicomputer at each work station controls as many as 20 different test steps, performing a complete functional checkout of Monojet, Dualjet and Quadrajjet carburetors. Test programs are stored in the 24K memory of the 16-bit minicomputers.

An operator places the carburetor on the stand, where it is clamped in place while an air and fuel mixture is forced through its chambers.

The test stand's screwdrivers and wrenches, which the computer controls through solenoids and stepping motors, preset the fuel and throttle adjustments

and the computer then measures their performance under simulated operating conditions.

The measurements are compared with test specifications for the model being tested and corrective action, if necessary, is made. Some of the settings checked are wide open fuel, minimum air, exhaust gas recirculation systems, spark vacuum, off idle, idle and part throttle fuel flow.

When automatic adjustments are finished, the operator puts limiter caps on the screws so the carburetor's settings cannot be tampered with later.

The minicomputer programs are changed every eight hours to match varying model production.

The basic system includes an SPC-16/65

CPU with 24K words of 16-bit memory and one external I/O enclosure. Each enclosure contains a standard 16-channel analog-to-digital converter, a two-channel isolated digital-to-analog converter, a standard 1581 communication controller, space for an RPD-furnished module, a four-channel stepping motor controller, 96 digital output lines and 96 digital input lines with provision for 32 spare digital input and output lines interfacing to control a 256-character display, an isolated process interrupt module and capability for a cassette tape input.

The enclosure offers two other major features; a multiple initial program load feature for programming from a teletype, a central computer (over communications

lines) or a tape cassette, and a temperature alarm circuit that detects over-temperature conditions in the test stand or such things as fan failures.

The new minicomputer-based test system will not replace the existing 129-stand network controlled by the GE computer, but it offers many advantages, including 18 to 20 tests on each carburetor, where the older one performed 14 tests.

Perhaps the most important factor, however, is reliability. If there are 150 minicomputers each doing the work of a single work station and one of them goes down, it only takes 1/150th of the system out of operation rather than the entire system.

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Software Study Finds

Factory DP Big Market for Independents' Packages

By Don Leavitt
Of the CW Staff

Even though software related to factory data processing (FDP) is often supplied by the computer vendor or written by the user, there is "a substantial and growing market for special programs" written by independent software houses, according to a recent study released by Quantum Sciences.

The "Intelligent Factory" uses FDP as a term that encompasses factory data collection devices (but not process monitors or controllers) and the software used by management to control the factory organization and various production operations.

Within that broad definition, Quantum noted "available programs are used in management information systems (MIS), production scheduling, inventory control, load forecasting, machine loading, parts explosion, capital equipment records and employee time records."

As if that list were not long enough, the study then added, "More programs will be needed as factory operations are integrated into subsystems and complete factory automation systems."

A review of *ICP Quarterly* and advertising aimed at managers of factory DP shops confirms that vendors are available.

And Quantum probably was right when it noted at another point in the study that "software improvements will account for half of system development costs during the 1974-84 period and will be more important than further improvements in hardware."

A Confusing Picture

But there are points of contention — as well as points of agreement — that confuse the FDP software picture.

MIS, for example, means many things, or nothing, to many people. The phrase apparently was coined by IBM back in the days of the 1400 series and the first dreams of fully integrated applications.

"The term is ambiguous," agreed Prof. James Emery of the Wharton School of Business and a past president of the Society for Management Information Systems. "I see MIS as including both transaction processing (accounting applications) and decision-making support components. But others try to limit the phrase to the decision-making support components by themselves."

"The boundary is hazy at best," he added, "and we're going to get carryover anyway. You can't play 'what if' games and run models without some tieback to the company's real experience."

In 1972, Time Sharing Information Services published a description of some 50 management information systems then available on various remote computing networks, but currently the phrase does not appear in the table of contents of software catalogs such as *ICP Quarterly*.

Application Areas Clearer

While there is debate over phrases like MIS, there is less confusion on individual application areas within the area Quantum called FDP.

Richard Daley, president of Comserv Corp., noted, for example, that Comserv's Manufacturing and Production Systems (Maps) software "uses terminology that is pretty well accepted" by the industry.

Much as that sounds like a puff, he added Maps terminology is "pretty close to what IBM uses in Copics — and very close to what is in Pics."

Such a specific reference to the Communications Oriented Production and Inventory Control System (Copics) seemed to confirm another Quantum thought, that "software should be compatible with the IBM Copics system, which is likely to become the de facto standard for the industry."

Copics is "a powerful set of concepts... which provide an approach to an integrated manufacturing system," Quantum explained.

"Problems common to most manufacturing companies, from forecasting customer requirements through production scheduling and control, and shipment of the product, are included in the [Copics] concepts."

An earlier set of concepts, Production and Inventory Control (Pics), had many of the same features but was not communications-oriented, the study noted.

Robert Galante of Software International tended to agree, but with reservations. "Copics is primarily a concept. It is supported by various pieces of software but there are gaps between those pieces."

Overall, it represents a "fairly good standard" for industry, he said.

Referring to specific applications, Daley noted today "Materials Requirements Planning (MRP) is the 'hot item' for manufacturers. Materials control throughout the factory is essential. To have control, you have to know what your requirements are and you have to be able to relate that to machines and people."

Turning to another FDP "buzzword," Galante noted that "bill of materials" processing is a vital part of MRP. To show why, he explained that early inventory systems were based on order points determined from historical data "and sometimes, quite sophisticated forecasting techniques."

This approach works well enough for finished goods, he went on, "but it has never been very satisfactory for component inventory. And there is a fairly simple technical reason for that failing."

Stock levels for finished goods are set after the user has weighed the trade-offs between the level of service to be provided his customers and the cost of stock and its storage space.

"Some inventory gaps are inevitable — and are accepted — in that situation," he continued, "but the manufacturer must have all his components on hand, or in a known location or status, before he can start to assemble his end

product.

"Bomp [Bill of Materials Processor] provides support at this level. It translates end-order requirements into component requirements and time phases them. This entails many computations and is clearly a different operation than order-point processing," he concluded.

Shopping Around

The wide range of logical facilities, machine and memory requirements and costs of the FDP-type software that is available, often with very similar names, poses real problems for the manufacturer who is shopping around.

Emery has noted that current offerings range from "very pedestrian routines — miniprograms, really — to what I would call legitimate decision-making support systems."

Vendors with fairly complete systems are offering clients more flexibility and, paradoxically, more standardization than ever before. The monolithic, generalized system that was to be all things to all people is gone. In its place, effective vendors offer either customizing of a base system, or modular construction, or both.

Daley is very open about Comserv's approach: the company expects the user to do a lot of planning, and it has a rule-of-thumb that customizing of any of the modules in Maps, for example, will average twice the base cost of the module.

This add-on cost varies a lot, Daley said, but in most cases "it will be significant."

Galante noted that his company, which formerly went heavily into customizing work for each customer, has moved toward modular system designs instead. Once the user's basic planning is done, "this allows an approach based on a 'shopping list' rather than a 'reconstruction plan' in order to get to the application logic the user really wants," he commented.

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COMPUTERWORLD

'Mics' Never Loses Sight Of Uranium Powder Pails

WILMINGTON, N.C. — Tightening federal regulations and growing volume induced General Electric Co. (GE) to replace a batch data collection system with an on-line manufacturing information and control system (Mics) at its Nuclear Fuel Department plant here.

Mics identifies and follows a fuel container each time it is moved, emptied, filled or otherwise handled. The system processes more than 6,000 such transactions daily.

Mics also takes part in maintaining the plant's quality assurance system. It guides operators through a sequence of steps, records the results of tests on uranium and maintains "release gates" through which material cannot pass until it has satisfied quality control standards.

GE and the Sierra Research Corp. of Buffalo, N.Y., jointly own Mics' design, according to Dr. Robin Kerr, manager of information systems structures and techniques.

Sierra implemented systems software and all hardware, Kerr added, and GE designed the application software and jointly implemented it with Sierra.

Hardware includes two 32K (16-bit word) Honeywell 316 CPUs, two 12M-character disks, two magnetic tape units and 79 terminals located throughout the plant.

Pinpoints Container Locations

Sixty-nine of the terminals are located within the plant's manufacturing areas and are operated by plant employees as they process uranium into fuel rods for commercial atomic power reactors.

The other nine terminals in the system are inquiry response terminals used by plant managers. These terminals can print out a variety of reports, including a complete listing of the uranium containers within a particular factory area.

The accuracy of the list can be checked by closing off the area and comparing the list with the containers present. About 98% to 99% of containers are exactly where the system indicates they are in these tests, Kerr stated.

The Mics also produces magnetic tapes of inventory data; inventory accuracy is crucial to meeting U.S. Atomic Energy Commission standards for accountability of nuclear materials. An accurate inventory also helps prevent waste of time, money and energy in the manufacture of nuclear fuel.

System Guides Operator

Each container traveling through the factory carries a punch card on it for identification, Kerr said. The operator enters data through a keyboard terminal that has an eight-digit LED display. The terminal has a preprinted back screen which uses lights to show responses to the operator.

The operator enters the container's identification card and his badge number. In turn, the system guides him in the se-

quence of operations to handle the container.

As the information enters the system, the computer compares it with the previously recorded history of the container. It also checks the logic of the transaction against programmed information about the flow of materials within the factory.

If the operator makes an error, he gets another chance at the correct procedure, Kerr noted. If that doesn't work, the system indicates the operator should call a foreman and prints a message on a control room console. But if the operator starts with

an "illegal move, we don't give him any second chance," Kerr stated.

Operator training is one reason Mics works as well as it does, he said. And the training now covers people at all levels who have any contact with the system, he added.

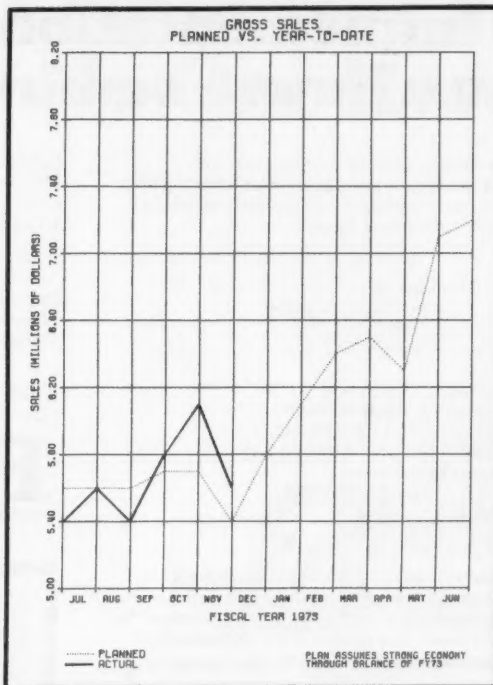
The nuclear fuel plant has had Mics since August 1973, Kerr said. The plant went through a four-month parallel operation with the previous system, in which operators inserted container identification cards into IBM data collection units and keyed in other information which was collected at a key-punch in the control room.

GE decided to go to the on-line system because safeguards had just been tightened and volume was up at the plant, Kerr explained.



An operator at GE's Nuclear Fuel Department plant keys in data on individually identifiable pails of uranium powder.

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 **GOULD**

Mini Chosen Over Human Operator For Test Monitoring

FINDLAY, Ohio — When Whirlpool Corp. chose to build its own dishwasher waterfeed pumps for the first time, rather than rely on an outside supplier, the company decided to test each of its pumps before installation.

And the question arose whether a human operator or a automated system should monitor the testing operation, according to William Beck, project process engineer for Whirlpool's operation here.

The company considered both approaches and then opted for a mini-computer-controlled system, Beck said.

For a two- or three-month period in 1971, before the computer was installed, the company had a hard-wired timing device controlling the test sequence while a human operator read the test result meters and wrote the figures down.

After the switch to the computerized system, the company found it was both more accurate and less expensive, Beck remarked.

The CPU for the test facility is a Digital Equipment Corp. (DEC) PDP-8/E 12-bit minicomputer linked to an ASR 33 teletype, a DK8-EC real-time clock, dual DEC tape drives, an AFC-8 analog input subsystem and the PDP-14 programmable controller.

Software includes editors, assemblers, compilers, loaders, debugging programs and various utility programs. The system simultaneously controls and monitors

both wet and dry test stands.

Data logging includes running time on the computer and counting the number of pump units started on the conveyor.

The system is designed to permit an operator to determine interim productivity, production counts, conveyor up-time and other supplemental data.

Fulfills Five Parameters

The Findlay Division began working up the computer testing procedures early in 1970, with Whirlpool research developing the software system based on standards to be met by its pumps.

All preliminary work was based, Beck said, on system fulfillment of five basic parameters: providing a quality control check of all pump assemblies produced by Whirlpool; providing regular production reports on the quality control procedure plus a historical summary of the total testing results; gaining operating data for design engineering and for future analysis of field failure conditions; providing data which would hasten the growth of other Whirlpool test and control functions; and assuring undelayed production while conducting the outlined test procedures.

The system evaluates five properties of each pump as it moves down the conveyor line: motor current (amps), power (Watts), pressure, flow and current leakage of the grounding system. These

properties are tested both in the wash (forward) and drain (reverse) modes of operation.

To perform these tests, Whirlpool installed test stands at the end of its assembly line conveyor belt. An operator clamps each arriving pump into one of these stands and closes two switches.

From that point on the test procedure is in the hands of the computer and controller.

Awaits Instructions

As each pump moves through the test, it is first submerged in water. The system then tests to determine the state of the pump's grounding. The pump must clear this test before moving to any other test station.

If a faulty ground is indicated, the computer sets off a red "ground defect" light and records it as part of the total number of defects. The CPU stops the test system and goes into idle, awaiting instructions to conduct another test.

Once the ground defect has been recorded and the signal light shut off, the system continues to test each pump, reading amps, Watts, pressure and flow and comparing these readings with the minimum and maximum specification values already established and stored in the computer system.

In cases where the pump fails to meet standards, the computer will "flag" the

pump or activate the red light.

At the outset of each test, the computer is given the serial number of each individual pump. When the test is completed, those which have been red-lighted or flagged will not be recognized by the test system until the problems have been resolved or the pump rejected as defective.

As the system is conducting its test sequences, the computer also records the data produced at the test stands, entering it into a permanent record on magnetic tape.

Form Data Bank

These tapes form the data bank that Whirlpool uses to determine the effectiveness of its production facilities as well as the effectiveness of its test program. Reports are broken down to include air and water test results and show how the computer/controller system contributes to the overall procedure.

The system also reports on itself, telling management how long it operated, how many units it tested, how many units were rejected and how many approved.

"Knowing these numbers," Beck pointed out, "gives us an overall efficiency factor as to the percentage of good units to bad. It also tells us how efficient our initial production system is."

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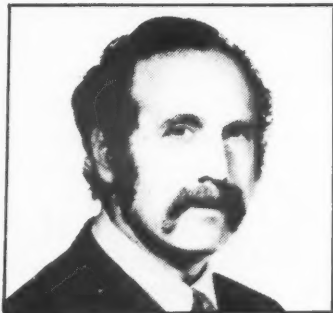
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Generates Production Instructions**System Weighs Load Factors in Design of Steel Poles**

COATESVILLE, Pa. — The Bruce Lake Co., a manufacturer of tubular steel poles for the utilities industry, is using a mini-computer to help design its product, produce instruction books for work stations and handle payroll and accounting functions as well.

The poles are individually designed for site conditions. Design is based on required height and the loading on the pole.

Examples of loads are wind forces, weight of the wires carried by the pole and possible load imbalances.

The company's engineering staff develops the design data and records it off-line on a Texas Instruments 700 tape cassette terminal. When run time is available on the company's 64K byte Data General Nova 840, the cassette terminal is switched on-line and transfers the data to a designated disk file.

An operator at a General Electric Terminal console then calls up the proper design program, also on disk, and instructs it to operate on the designated data, explained Jim Hudgings, engineering and computer services manager.

"We have the program designed in such a way that it will design several reasonable poles" and select the lightest alternative, even if there is only a two pound difference, he said.

The optimizing technique was written in Fortran IV, using Data General's real-time disk operating system (RDOS).

Less Costly Than Time-Sharing

Before the computer system was installed, Bruce Lake was using a time-sharing service. The heavy design work load and slow output speeds meant that Bruce Lake had to be on-line 10 to 12 hours a day, five days a week. Some monthly costs were as high as \$20,000.

With the in-house computer, "we have doubled our design throughput," Hudgings said, "without doubling our costs or man-hours expended."

At \$72,000, the system cost "about as much as four heavy months of time-sharing," he commented.

Although improvement of the design procedure was the original reason for purchasing the system, Bruce Lake has implemented manufacturing tasks as well.

A shop support system, written in Fortran, produces computer-generated fabrication documents listing assembly instructions by work station for each order.

Based on the information from the design program, the computer system prints out details for raw material selection size and gauge of metal plate needed; cutting instructions, which include generating pa-

per tapes for numerical control flame-cutting equipment; break instructions for bending the plates to form half sections; welding (two half sections are welded to form 20-ft sections); and joining (sections are joined together to form the pole).

The entire pole-manufacturing operation now works according to the fabrication package, rather than to blueprints as before.

"We found that most of the information on our blueprints was computer-generated anyway," Hudgings said. "Transferring this information to the prints always resulted in a certain level of transcription errors, so we just eliminated that intermediate step by taking further advantage of the system's print capability."

System Received Well

"We were somewhat concerned about how it would be received," he said, but "the shop loves it." The individual worker "doesn't have to read a shop drawing" but "gets exactly what he needs to perform his job," he explained.

Bruce Lake has also written an inventory control system in Basic. Other tasks performed by the system include payroll and job costing accounting, both done in Basic. Job costing is done both by job and by work station.



A shop employee at the Bruce Lake Co. uses computer-generated fabrication instructions while operating his break press.

The system's peripherals include dual disks providing 4.8M characters of storage, a paper tape reader/punch, a magnetic tape subsystem, two job entry terminals for the raw design input and a line printer/plotter for the design specifications.

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Roy Freed has specialized in computer-related legal matters for many years. He has served as inside counsel for a major manufacturer of digital computers, and is currently engaged in private practice with a prominent Boston law firm.

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COMPUTERWORLD

Scandinavian Airlines Finds

Front End Investment Pays Off in Manpower Savings

By Rolf Rulander

Special to Computerworld

STOCKHOLM — Although Scandinavian Airlines System (SAS) had to invest 30 man-years to develop its Telcon front-end/message switching system, the result has allowed the airline to cut the ranks of its communications supervisors by 50%.

Where supervision had previously been spread through the three Scandinavian capital cities, it is now concentrated at one site. The once separate front-end and message switching functions are now combined, and the routine task of dealing with incorrect messages has decreased considerably since these are now rejected at the terminals.

Telcon is based on Collins Radio Co. hardware and interfaces the airline's "Sasco" application computers. The fact that SAS had to deal with a number of different terminal procedures in several national and international nets prolonged the development effort.

Lack of standards on medium-speed terminal interfaces and computer interfaces was another burden to designers.

Among Telcon's notable features are an addressing structure that allows use of a terminal for various applications, on-line updates of system tables by command, load regulation protection from overload damage, testing while traffic is being handled on-line and logging all transactions.

Three 'Ends'

The installation of Telcon, completed in 1973, remains divided among Copenhagen, Oslo and Stockholm. The "front end" consists of two processors at a manned communications center in Copenhagen, while unmanned "remote-end"

concentrators are used at the other sites.

The latter handle interfaces to all types of terminals in the network. They also take care of establishing connections to the terminals, polling and calling procedures, input/output handling, code conversion, idle handling and disconnection.

The front end loads the remote-end processors from programs and tables stored on front-end disks. Initialization can be requested by the remote end or ordered by the central supervisor. Errors in the remote end or on the terminal interfaces are reported to the front end for further actions.

The front end consists of a dual processor with disk drives, tape units and various printers. The two processors work as a shared load system; either one of them can handle the total load.

The traffic between terminals and the Sasco application computers is mainly request/response-type and is core-switched in Telcon. Telcon also acts as a store-and-forward message switching center for telegram messages, storing those messages on disk.

Both Telcon and the applications computers maintain the same identification number for individual terminals. This means a terminal's identifier does not require translation at the interface between Telcon and Sasco processors.

Logical identifications also define applications in different processors.

The logical identification together with a processor identification provide the routing elements for traffic flow. The addressing structure within Telcon is thus independent of any device-oriented scheme which must be used by the terminal interface handler.

The terminal operator selects an application through a control message. A similar control message can also route a message to any other terminal connected to Telcon. Both core and disk switching is available for the different types of messages.

One goal for Telcon was that it be a flexible system responsible to the changing demands of its users. To achieve this, the system can provide for on-line update and display of the tables controlling the terminal configuration and routing.

Thus, lines or terminals may be added or deleted, or the line with which a terminal is associated can be changed, so can the terminal's identification and its physical address.

In order to guard against buffer overrun and resultant loss of messages, Telcon has various controls to protect against overload during abnormally high traffic periods.

At the remote end, input to the mini-computers is cut off, although all transactions in progress are completed first.

The front end retains three thresholds so that the most urgent transactions can continue while those of lesser importance are delayed.

Test Possibilities

A stand-by system on the applications computer side serves as a test system for new applications. Terminals connected to Telcon can enter messages into the test system. Telcon also controls the output from the test application so it is not mixed up with other on-line messages.

Telcon can also send test data into either the front end or an applications computer or to a terminal. Additionally, Telcon can be configured so that its stand-by processing capacity can be used for program testing.

Telcon logs all messages chronologically on tape. With a dual tape technique, writing to a stand-by tape begins when the current tape is full or malfunctioning. Additionally, remote-end processor dumps are stored on disk and logged on tape by request. Front-ends dumps are written to tape as an off-line operation.

Rolf Fulander is with Scandinavian Airlines System, Stockholm, Sweden.

IBM 3275-Type Terminal Sends 9,600 Bit/Sec

By Ronald A. Frank
Of the CW Staff

NATICK, Mass. — Incoterm Corp. has introduced a programmable terminal compatible with the IBM 3275, but which offers additional features and costs 25% less, according to the firm.

Called the SPD 325, the terminal offers users transmission speeds up to 9,600 bit/sec, while the IBM device has a top speed of 7,200 bit/sec. The terminal includes a printer that operates at 165 char./sec, while the 3275 has a top printing speed of 66 char./sec.

The SPD325 has a 12-digit numeric pad for arithmetic calculations and a "unique" 960-character screen formatted in an 80-column by 12-line pattern for keypunch image data entry, Incoterm said.

Constant Screen Image

No-cost options include a constant screen image. This differs from the IBM terminal screen which goes blank for up to five seconds while data is being transmitted out of the buffer, an Incoterm spokesman added.

The 325 can indicate control or "attribute" characters by displaying a hash mark at the start and end of a defined field, and it has a numeric field lockout limiting data entered to letters only.

Neither of these is available from IBM.

The terminal is available in dual station configurations attaching two CRTs to one intelligent controller. The device can operate with any IBM 360 or 370 that accepts 3275 interconnections.

Programmable Processor

A basic system includes a programmable processor with 4K bytes of main memory and 2K or 4K bytes of screen refresh memory. The terminal accommodates both Ebcdic and Ascii code and is designed as a stand-alone unit in private-line communications nets.

TDM Aimed at 'Entry-Level' User

EL SEGUNDO, Calif. — Computer Transmission Corp. has introduced a time-division multiplexer aimed at "the entry-level data communications user."

The M1215 Multitran can simultaneously accommodate up to four synchronous terminals and up to 12 asynchronous terminals over a voice-grade or wide-band line. The unit can be field-expanded to handle up to 115 asynchronous terminals, a spokesman said.

The multiplexer can be set for eight code/speed combinations and offers an autospeed feature.

It can also serve as an input/output system for the firm's M3000 series of digital circuit switches.

An M1215 equipped only for asynchronous terminals costs \$6,350 including cabinet and power supply. Asynchronous I/O modules cost \$350 each for two channels.

The synchronous I/O package adds \$600 to the base price, plus \$120 to \$450 for each module. Lease plans are available, the company said.

Delivery is 30 days from 2352 Utah Ave., 90245.

MCI, WTCI to Link Nets

NEW YORK — MCI has agreed to integrate the Western Telecommunications, Inc. (WTCI) private-line microwave network with MCI's system. The move could mean coast-to-coast service for MCI customers before mid-1975. Final approval depends on stockholders and the FCC.

WTCI's network presently serves Los Angeles, San Francisco, San Diego, Phoenix and Tucson. MCI will begin serving customers on this net by January 1975. With the addition of the WTCI system, MCI needs facilities only between Albuquerque and Tucson to complete its nationwide net.

In another move of interest to MCI customers, the U.S. Third Circuit Court of Appeals has rejected still another appeal by AT&T to stop MCI customers from having FX and CCSA facilities. Based on an earlier ruling by the courts, AT&T must provide these private-line facilities to MCI customers.

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Occasional Failures of On-Line Systems Laid to Poor Application of Technology

By Don Leavitt
Of the CW Staff

NEW YORK — Despite the highly publicized failures of some on-line systems, there have been at least as many successful "marriages" of communications and computer technologies, and the lessons to be learned must consider both the good and the bad projects, according to Robert E. Wallace, division vice-president of Auerbach Associates, Inc.

Most data communications systems used for remote job or data entry work very well, he reminded an Info '74 session on effective use of communications resources.

The real problem occurs in systems that are transaction-oriented and require some kind of response from the computer in a fairly short time for every input, he noted.

"The plain bald fact is that the unsuccessful systems... were not properly designed for the problem they addressed," Wallace said. But a set of "Ten Commandments," followed faithfully,

"will guard against the principal causes of failure of this kind and go a long way toward assuring ultimate success."

Be sure an on-line communications-oriented system is necessary; don't consider it just because "it's the thing to do," he said. There is one, and only one, reason to implement such a system: to help attain the user's organizational objectives.

Better performance of the computer installation is by itself an inappropriate goal, he went on.

If management decides to go for such a system, Wallace added, it is mandatory that the users at all levels want it. It is best, of course, if they request it, he said, but by some process — including changing the people, if necessary — they must be made to believe in it. And they must be made to participate meaningfully in the system design, he said.

"Be sure you've got the horses," Wallace continued. "Never, never embark on a major project without experienced staff in a position of influence — unless you want to create a horror headline."

During the planning and development cycle, the user must determine in detail what is expected of the system.

Even carefully calculated estimates of

"As brokers in the marriage between computers and communications, management should be interested in consummation, not merely in making the engagement." — Robert E. Wallace

transaction volumes and reasonable expectations of response times aren't enough; the pattern of arrival of the transactions has to be known to determine how well the proposed system can cope with the load.

With information in hand from the pursuit of the preceding "commandments," Wallace said the user can and must make a final judgment on whether to proceed. Once every part of the organization that may be affected has assessed the proposed system's impact and supports it, the designer is really ready to go to work."

'Long Engagement'

"Be sure you have a schedule," Wallace said, becoming almost lyrical in noting "one of the most difficult parts of consummating the marriage between computers and communications is to convince users, managers and other interested parties of the need for a long engagement."

Even if the initial schedule turns out to be unrealistic, reminders of the original commitments should be made. These also provide a benchmark from which delivery date and other deviations can be detailed, he said.

The same basic reasoning applies to the need for a budget in conjunction with each developing computer-communications marriage, Wallace said. Budgets, particularly for operations, should be quite detailed, carefully preserved, validated every month or so and revised immediately when new information is discovered, the consultant added.

"Keep in touch," Wallace urged his listeners, reverting to Ann Landers-style prose to add, "As brokers in the marriage between computers and communications, management should be interested in consummation, not merely in making the engagement."

Finally, he said, once created the system "should be subjected before live use to as much end-to-end testing as one can afford under a wide variety of loads and under the most stringent standards that can be devised."

Once it has gone operational, the system "should be audited to determine how well it meets the original objectives established for it," he concluded.

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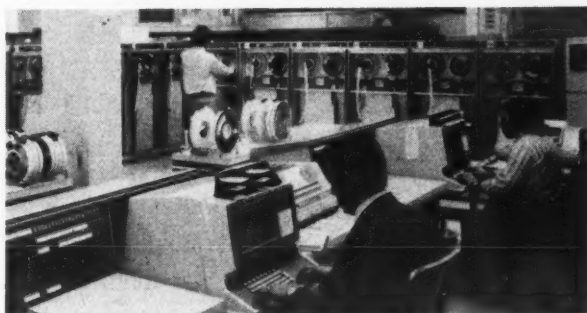
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Correct Line Speed the Crux Of AAFES Consolidation Effort

By Patrick Ward
Of the CW Staff

DALLAS — The success of a DP consolidation effort can depend heavily on the speed of the transmission links between the former computer sites and the new central installation.

That was the problem facing the Army Air Force Exchange Service (AAFES) when it planned to replace four IBM 360/40s and one IBM 360/30 in five regional distribution centers with Data 100 Model 78 remote job entry (RJE) stations transmitting to an IBM 370/158 here.

AAFES is the administrative headquarters for PXs and base exchanges in American military installations throughout the world.

Although all development work was done here in Dallas, each of the distribution centers in Arlington, Va., Montgomery, Ala., Golden Gate, Calif., Charlestown, Ind., and San Antonio, Texas, had their own DP shops.

On average, each of the centers produced 10 million to 12 million print line/mo on IBM 1403 printers, noted James T. Simmons, a systems programmer with AAFES.

There were no communications links to the Dallas headquarters, which received

printed reports, tape and card output from the regions, Simmons said.

Before a computer could be taken from one of these regional centers, Simmons said, the central data center group had to demonstrate that an RJE system could provide at least the same level of printed output.

The trial run of RJE in the San Antonio center in March 1973 did not meet this goal, he noted.

The consolidation group first used a Data 100 Model 78 terminal with 900 line/min printer, then tried the 1,250 line/min version, Simmons said.

When that upgrade didn't do the job, the group decided the 9,600 bit/sec transmission over Codex modems was not fast enough, given the width of the records being printed.

To achieve the needed throughput level, AAFES next tried Codex 296 bplexers with two 9,600 bit/sec modems.

This approach allowed full-duplex transmission up to 19.2 kbit/sec by combining the capacity of two independent voice-grade channels, each operating at 9,600 bit/sec.

This worked, and there are now RJE stations and bplexers at each of the five North American distribution centers.

Use of RJE has brought few operational changes at the remote sites, Simmons said. One beneficial change is that the central site can get a quick core dump when a problem occurs with one of the regions' jobs, he said.

The center's 2M-byte IBM 370/158 under VS2 has now taken over all the regions' workload, including accounting and merchandising applications, Simmons said.

One IBM 3705 handles the RJE workload, while another serves other inquiry applications at the center. There are 24 spindles of IBM 3330 disk storage and 18 IBM 3420 tape drives.

Other peripherals include an IBM 3211 and 1403 printers, a Potter 1403 IBM-equivalent printer and a Data 100 RJE terminal for development work.

The AAFES consolidated approach to DP has proved more economical than the previous method, Simmons said. He added that the Codex 296 bplexers with two Codex 9,600 bit/sec modems costs about \$700/mo for one end.

Hazeltine Adds CRT 1200

NEW YORK — Hazeltine Corp. has introduced the 1200 video display terminal.

The terminal provides a 1,920-character screen with 80 char./line by 24 lines and will operate at speeds up to 9,600 bit/sec. Options include lower case, current loop, answerback and an auxiliary EIA output.

The terminal is priced at \$65/mo including maintenance on a 12-month minimum rental. The purchase price is \$1,590 with first deliveries scheduled for October.

Hazeltine is in Greenlawn, N.Y., 11740.

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Data From 5,000 Posts Melded To Forecast Tomorrow's Weather

By Nancy French

Of the CW Staff

MONTEREY, Calif. — Each morning, groups of five-digit numbers crackle across the airwaves from world capitals and remote outposts around the globe to a Navy base here.

The transmissions are numerical representations of the earth's weather received from 5,000 ships, aircraft, land stations, satellites and automatic weather buoys and relayed through a worldwide network of computers.

Millions of these sets of numbers flow into computers every day at the Navy's Fleet Numerical Weather Central, where the data is sorted, integrated and stored for comparison with information accumulated the day before.

Then, under the guidance of skilled meteorologists, the computers produce weather forecasts for over half the world.

The numbers, in groups of five digits, are in a universal language equally understandable to the weather observer who speaks only Hindustani and the meteorologist who speaks only English.

The technique of reducing the world's weather to numerics was developed at Princeton University by John von Neumann in 1946, but the system became practical only with the advent of the large-scale scientific computer.

Here at Monterey, data reductions are performed on a system composed of twin 131K Control Data Corp. (CDC) 6500s sharing 1M words of extended core storage. Each 6500 is linked with a 32K CDC 3200 CPU.

Storage is provided for the 6500s on 6638 and 6603 disk drives. A bank of CDC 607s provides tape storage.

Still another CPU, a 16K CDC 8090 working as a front end, receives raw data from Air Force computers on U.S. soil and feeds it to the dual processor.

The contrast between the high technology unleashed upon the weather data once it is collected and the method of data collection itself is startling.

Strange as it may seem, weather observations are still based largely on information garnered from two instruments

developed more than 300 years ago — the thermometer, invented by Galileo in 1592, and the barometer, developed by his pupil Torricelli in 1643.

Observing the weather is one thing, but forecasting what the weather will be like tomorrow is still another. Gathering enough data on which to base predictions has long been a stumbling block.

How that has all changed, weather stations, linked to computers in Canada, France, Germany, Austria, Czechoslovakia and Spain, accumulate the necessary data from thousands of observers. The computers process the data into numerical code and exchange information with each other at electric speed.

The basic principle of numeric coding of weather information is simple.

The first five-digit group is a kind of Zip Code that identifies the sender and his location.

The first digit of the next set indicates what fraction of the sky is covered with clouds.

The next two numbers give wind direction and the last two, wind speed. Other code groups provide additional details such as temperature and barometric pressure.

To be useful for weather prediction, these numbers must be related to a complex series of mathematical formulas that express known hydrodynamic laws, stored in the computer's memory.

As soon as four hours of data have been gathered, the computer can begin sorting the data into patterns and applying the necessary algorithms.

Before the computer issues a "first guess" of what the weather will be like for the northern and southern hemispheres (from sea level to 100,000 feet) it compares the present day's data with the previous day's forecast. Data obviously out of tolerance is rejected.

When the first guess is printed out, professional meteorologists analyze the prediction to note any missing data or data obviously out of tolerance which the computer did not catch.

These technicians attempt to re-create the missing out-of-tolerance data and feed it back into the computer.

At the same time, new data accumulating in the system's memory is correlated with the data already in process and a second printout is prepared, predicting the weather for the next 72 hours.

Every 12 hours, the computers repeat the entire process using new weather observations to keep the forecast constantly updated.

The resulting computer-aided weather forecasts are remarkably accurate despite faulty information gathered by human observers.

Scientists are still refining the equations and revising the complex mathematical formulas used by the computer as they learn more about the mysterious interaction between air, earth and ocean.

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System Signals Danger Levels

Radiation Exposure Levels Monitored

SUNNYVALE, Calif. — A computer is being used here to keep track of the amounts of radiation absorbed by scientific and medical workers so they can be warned before their exposure reaches dangerous levels.

Monitoring radiation exposure for employees of hospitals, universities and laboratories in this and other countries, Radiation Detection Co. employs an IBM System/3 Model 10 to maintain total exposure records for clients, a company spokesman said.

The company contracts with employers to analyze badges designed to monitor radiation exposure. The Federal Government requires people whose jobs bring

them in contact with sources of radiation to wear such badges.

"Radiation is cumulative, building up during a person's lifetime," he commented. "After we 'read' a badge for a current dosage, we enter the amount of radiation absorbed along with the person's name into our computer and receive a printout with the person's name into our computer and receive a printout of his updated total exposure on a quarterly, yearly and lifetime basis."

When an individual's reading exceeds the maximum dose allowed by federal health and safety standards, Radiation Detection notifies the person's employer, who is then required by law to take steps to eliminate any possible hazard, the spokesman remarked.

The firm claims its use of the system has made it possible to return reports to customers "often within 48 hours of re-

ceiving a radiation badge."

Customers are provided with two basic badge types — a packet containing a special nuclear emulsion film and a newer thermoluminescent dosimeter, a unit containing a radiation-sensitive chemical, the representative said.

Collected most frequently on a monthly basis, the badges are mailed back for reading and analysis by technicians who determine from exposed film in badges the type of radiation, its source and the degree of exposure received.

Once this information has been entered into the computer, two copies of each dosage report are printed by the system, one for the customer and one for Radiation Detection files, the spokesman noted.

The system is also used to print labels for the fresh badges sent to customers.

At present no plans exist for putting



Special nuclear emulsion film is checked for radiation by a dosimeter at the Radiation Detection Co. which keeps track of the dosages absorbed by scientific and medical workers. A System/3 helps the company alert employers when the dosages exceed federal health and safety standards.

other applications on the system, he added.

UCLA to Build DP Science Lab

LOS ANGELES — UCLA's School of Engineering and Applied Science here has won a \$20,000 National Science Foundation (NSF) grant to build a computer science laboratory.

Designed to provide direct hands-on experience and experiments with computer systems, the facility will give students the opportunity to design, build and run devices interfacing with the computer, according to Bertram Bussell, the professor responsible for initiating and completing the project.

"We believe that the lab will give our students a feel for the practical aspects of computer construction and a change at creative problem-solving," he said.

While UCLA has a reputation for being particularly adept at giving its students a strong theoretical foundation in computer science, Bussell noted, the school has not been able to permit sufficient access to the insides of systems to prepare graduates for jobs in the industry.

"Our IBM 360/91 is too busy, valuable and inflexible to allow students to experiment with it," he added. So most classroom problems have been processed through remote terminals.

The lab's centerpiece will be a mini-computer with all the basic characteristics of a large commercial machine. In addition to standard system requirements, the computer should "represent the most modern technology and have a dynamically microprogrammable memory," Bussell said.

While the school is in the midst of accepting bids for the system, he remarked, UCLA would like a mini on the order of the Hewlett-Packard 21MX — "something with a semiconductor memory that will allow the user to tailor the computer to fit his specific needs."

By matching the funds provided by one of NSF's 289 grants for building institutional science equipment, the School of Engineering and Applied Science will have \$40,000 to construct and, initially, to operate the lab. "Some \$25,000 to \$26,000 will be spent on the mini," Bussell explained, "while the rest of the funds will be used to buy parts for the equipment students will build to interface with the computer."

The lab should be ready for classes in the fall of 1975. Bussell anticipates an enrollment of 1,100 computer science and other undergraduates during the first year, with some 20 to 30 students able to gain access to the computer each day.

He cautioned, however, that the computer will only be accessible to individual students or to small teams of three to four at a time. "We have no plans to go to a time-share system at this point," he commented, adding, "perhaps we'll make it a student project to build one."

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On-Line Data Retrieval Puts Banking in 'First Person'

DALLAS — An on-line information system utilizing data base/data communications techniques is enabling the First National Bank (FNB) here to offer "first person banking" that is highly tailored to individual customers.

Built around two IBM 370/155s and IBM's Information Management System (IMS), the system cross-references customer (including correspondent) information, provides performance evaluation data and produces exception reports for FNB Dallas' officers.

FNB Dallas is a wholly owned subsidiary of First National Bancshares, Inc., a Dallas-based bank holding company. As of January 1974, its data processing work was provided by a services company, First International Services Corp. (FISC), also a wholly owned subsidiary of the holding company.

Now, with a single interrelated data base which all bank functions use and contribute to, FNB Dallas gathers information in computer-usable form at each operat-

ing level. As new departments move into the information system, they work with the computer much as the Commercial Loan Department does, collecting information and entering it into the system as soon as possible.

Greater Responsiveness

Julian Rogers, vice-president, loan operations, noted that the direct entry method has not only streamlined information flow, but also permits greater responsiveness to changing business conditions.

"Because of the close cooperation between my staff and FISC, we've been able to implement our on-line data entry and inquiry system in record time — and at a level that truly enhances our competitive position. We now use the system not only to process the traditional banking applications, but also to give us leads and ideas about our marketplace and our customers."

As an example, Rogers pointed out that

reporting and updating procedures for the bank's commercial loan information system provide total liability accounting for each customer. As loans are made, payments received or collateral position changes, the computer analyzes conditions and displays them in graphic form on the screen of an IBM 2260 visual display terminal.

A special feature of the FNB Dallas system incorporates a daily stock price report with an automatic analysis of collateral position. When a collateral stock changes price, the computer automatically reevaluates loan security positions. The system tells loan officers which customers should be contacted for additional collateral.

Conversely, when a customer's stock value increases, his loan officer can advise him immediately of his equity position, helping him decide how to best manage his resources.

Senior management uses the same system to determine:

- Portfolio Status: a stock-by-stock analysis of the present value of stocks held by each customer.

- Officer/Division Status: a current total by officer or by division, comparing performances year-, quarter- and month-to-date with other divisions and with overall bank averages.

- Customer Financial Status: cumulative data about each customer's loan condition including detailed information on each loan as requested.

- Participating Customer Status: analyses of correspondent bank activity.

Not all information is handled by way of CRT terminals in the commercial loan system. While more than 40 different displays can be called up, printed reports are run nightly (after daily interest accrual). They contain various types of reports that are not extremely time-critical.

The printed reports include summaries of note and participation trial balances, notes tied to the base rate, division earnings and performances, under-margin collateral reports, loans by collateral type and portfolio positions by rate and maturity.

Also run are maturity reviews, summaries of commitments and loans available for participation. More than 80 kinds of printed reports can be requested by management in advance through the terminals.

The on-line system also facilitates bank examination, Rogers said.

Before the computer, the bank examiners had to wait a week before they could compile loans secured by bank stocks, for example," he explained. "Now, we can order the report in the afternoon and deliver it to the examiner the next morning. It provides him detailed information about all customers using bank stock as collateral, outstanding loans and related details.

"We can give the examiner whatever 'cut' of information he wants from the single, computer-controlled information base."

Robinson noted that as other departments have completed their conversions to on-line operations, similar benefits accrued throughout the bank.

"The single customer information file provides real support to our new 'first person' marketing effort," he pointed out. "It gives our customer representatives the pertinent information they need to better serve individual customers."

FNB Dallas' First Person Banking Center is adopting a single master form which a new customer has to fill out only one time. The master form contains all the necessary information for him to obtain services ranging from a checking account and overdraft checking to savings, Master Charge, a safety deposit box and installment loans.

As a customer's business grows with the bank, his file reflects it, and a telephone call to his first person banker can initiate a request for any bank services for which he is qualified. Accessing the computer's files via terminal, the banker can see all of the activity and bank services which have been performed for the individual customer in the past, current position and history, by type of transaction.

"Before the computer-based customer information file was available to combine diverse information sources in a single customer record, we could only guess at our track record. Now, we know where we stand with each individual customer and can identify the kinds of retail services we believe will help him," said C.O. Horn, vice-president, First Person Banking Center.

Horn feels in-plant banking, industry-related loan programs, automatic direct payroll deposits and electronic fund transfer systems are all appealing to customers and noted that all the new techniques are supported by FNB Dallas' developing on-line information system.

50% and guess data entry costs?



Costs are reduced and so are errors. Use of Sycor's 340 intelligent terminal with dual flexible disk in a typical order entry application can, in fact, reduce keystrokes by 50%.

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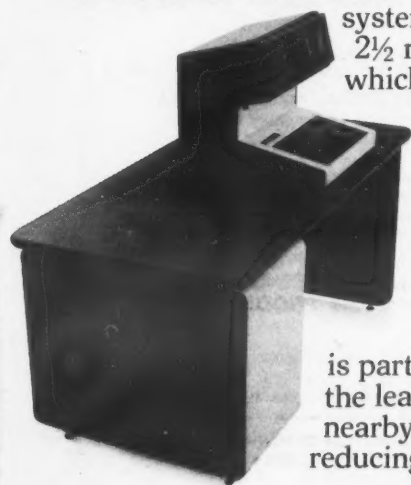
allows you to store customer, product/price and salesman files right where you need them most — at the source of the data. And you can use it not only to retrieve data, but also to maintain and update files — even generate reports. And you can do it fast... because the Sycor flexible disk has the fastest access time in the business.

Hard disk, too. For larger file applications, our Model 340 with its new hard disk drive performs all the functions of the dual flexible disk

system, but with a capacity of 2½ million characters. All of which can extend your remote data base management capability into new cost-saving applications.

From the people who brought you intelligence. This new concept of remote data base management wouldn't be possible without the intelligence of our Model 340 and its powerful TAL programming language.

The Sycor 340 and its wide variety of peripherals is part of the family of intelligent terminals that have made us the leader in the field. For more information, contact your nearby Sycor representative. He's got all the answers for reducing your data entry costs.



SYCOR

Study Predicts SSTs Could Deplete Earth's Supply of Protective Ozone

CAMBRIDGE, Mass. — Exhaust gases from an international fleet of 500 supersonic transports (SSTs) could destroy a high percentage of ozone, the protective component of the atmosphere that makes life on earth possible, according to researchers at MIT.

The researchers simulated the world's atmosphere on an IBM 360/95 at the Goddard Institute for Space Studies under a grant from the National Aeronautics and Space Administration.

And, although the number of SSTs that will eventually be built is unknown, the simulation runs indicated that 500 SSTs, flying eight hours a day for one year, would release about 1.8 megatons of nitrogen oxides, the chemicals that react with ozone molecules to break up and destroy them.

This amount, the researchers said, would deplete the ozone by 16% — enough to upset the earth's ecological balance.

The mathematical model of the earth's atmospheric circulation, extending from the earth's surface to an altitude of 70 kilometers (some 43 miles) and embodying vertical and horizontal flows as well as seasonal wind and temperature variations in both hemispheres, is the first such three-dimensional one, according to the researchers.

The MIT model will be applied next to studies of ozone destruction by two other chemicals — chlorine, which is injected into the atmosphere by solid rocket fuels, and freon, which is released from aerosol sprays and discarded refrigeration compressor machinery.

On-Line Literature Search Aids Canadian Nuclear Researchers

Special to Computerworld

OTTAWA, Ont. — The Chalk River Nuclear Laboratories of Atomic Energy of Canada have become the first customers of the recently developed on-line computerized information retrieval service of the National Science Library.

The service, called CAN/OLE (for Canadian On-Line Enquiry), allows for a quick search of the published scientific and technological literature for items relevant to the needs of researchers at the nuclear research facility at Chalk River, Ont.

The system went operational earlier this year and currently contains about 530,000 references in physics, 320,000 in engineering, 340,000 in biology and 270,000 in chemistry. Further expansion is under way.

Searches at the research facility are handled via a Vucom 1 CRT terminal with attached printer. A search that may

take half a day by manual methods can usually be completed in 10 to 15 minutes, according to scientists.

A variety of questions can be asked, such as what scientific papers are available on valves for nuclear reactors. A search of the reactor section of the engineering references for papers key-worded or title-worded with valves and produced at MIT, for example, would narrow the search down to a few papers.

A quick scan of dates or authors would probably obtain the exact paper desired.

Another search might be for a newly formed research group on uranium enrichment. By asking the physics, chemistry and engineering sections for all papers on uranium enrichment or uranium isotope separation, a rather extensive bibliography can be obtained to give a working group a good start.

The CAN/OLE system is designed for retrospective searching, searching for what has been published over the past few years. However, tens of thousands of reports, books, patents, articles, etc. are published each month and it is becoming increasingly difficult to keep up-to-date with what is being published in any one area.

This problem is taken care of by a second National Science Library system, CAN/SDI (Canadian Selective Dissemination of Information).

A profile consisting of a number of words and codes is designed to represent the interest of a researcher; as references to published literature are received, they are also coded into the computer and compared with the profile.



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CI Notes

Race Is On

Banks Seen Hot Market for EFTS

DPF Files Suit Against IBM

SAN FRANCISCO — Lessor DPF, Inc. has added its name to the list of firms filing antitrust suits against IBM. DPF has filed for \$45 million in trebled damages and has asked leave to modify this amount pending further evidence.

The lessor claims that IBM, by "predatorily" lowering the prices on its peripherals, reduced the value of DPF's inventory and also the cash generated by that inventory.

The suit is largely based on findings in the Telex-IBM case, which is under appeal.

Univac Trims Force

BLUE BELL, Pa. — In conjunction with the consolidation of the Remington Office Systems and Univac divisions, Univac has reduced its work force by about 300 persons, a spokesman said.

About 100 employees were laid off in the Philadelphia area and about 200 in the Twin Cities area, he said. The cuts were "across the board."

CDC Demonstrates Micro

MINNEAPOLIS — Control Data Corp.'s Aerospace Division demonstrated a micro-programmable processor capable of running a tactical mix of instructions at speeds greater than one million operations per second before officials of the U.S. Navy, Hughes Aircraft Co. and Grumman Aerospace Corp. here recently.

Designed to be a general-purpose emulator, the device can process code written for machines of 16-, 24- or 32-bit word lengths, and its 675 nsec core memory is available in modules of 16K 18-bit words.

Supershorts

McDonnell Douglas Corp. has awarded a \$99,000 contract to Computer Power Australia Ltd., Pty. for specialized software programming. The contract includes the sale to McDonnell Douglas of Pogo, a high-level systems language for the PDP-11.

Dataset Ltd., a wholly owned subsidiary of International Computers Ltd., will market Scan-Optics, Inc.'s optical character recognition products to ICL customers in the UK.

TRW Datacom International, Inc. has formed an affiliate company, TRW Computadores, to market its line of Data-point data communications systems in Brazil.

Centronics Data Computer Corp. has established a Canadian marketing subsidiary.

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK — The banking industry promises to be one of the hottest markets for computer equipment — particularly terminals and minicomputers — over the next few years, as major banks race against one another to install electronic funds transfer systems (EFTS) and point-of-sale (POS) systems.

That conclusion was clear in a presentation on EFTS here at Info '74, though it was never stated quite so bluntly.

The banks, caught in a competitive marketplace themselves, will be forced into greater use of POS equipment, Robert H. Grant, president of R.H. Grant Associates, indicated.

Larger banks will lead the way, he said, setting up their own POS systems in local retail institutions.

These aggressive large banks — such as First National City Bank in New York City — will install POS and EFTS equipment in the hope of increasing their share of the banking business, he predicted.

Moves by these banks will force many other large banks to do the same, he said.

Smaller banks will then face extinction unless they use such equipment on their own or band together to offer the same service, he said.

The major push, he continued, will come in the area of POS and EFTS instead of direct deposit and authorized

bill paying, which obviously will mean more business for DP manufacturers.

Because of the pressures on banks, he said, banks should be operating around 700,000 POS terminals and 40,000 to 60,000 cash dispensing machines by 1980.

At the same time, costs will be coming down drastically. Grant predicted a fall of 40% for specialized terminals over the period, along with a decrease in communications cost as new communications

services are developed.

But the larger mainframes may not be one of the biggest growth areas, he indicated, noting that there should be a rapid and large growth in the use of minicomputers for switching and concentrator functions in these networks.

Dr. William Ford, executive director of the American Bankers Association, said the real key to growth of these services will be the penetration banks can make in the supermarket field.

SDLC Called Industry Standard, Move Gets General Approval

By Molly Upton
Of the CW Staff

NEWTON, Mass. — Reaction to IBM's unveiling of equipment operating under the full-duplex Synchronous Data Link Control (SDLC) generally acknowledged that the industry standard communications discipline has now been established.

With comments varying from an enthusiastic "It's about time" to a bias "It doesn't really affect our product line," manufacturers of communications processors and terminals generally took the announcement in stride. Many said they have been working on SDLC protocol in anticipation of the move.

Paul Byrne, vice-president of systems engineering and planning for Comten, Inc., called IBM's complete systems concept "beautiful." He noted that Comten for some time has been working on "trying to make some sense out of these communications networks. I just think it simplifies our problem and the base that we stand on."

"I think the announcement is healthy." Now users can have distributed processing networks where the nodes are not all IBM processors, he said.

"There is going to be more interchangeability as the industry matures, and going to SDLC is a step in that direction," Byrne said.

Vendors will have to provide support for both SDLC and advanced data communication procedure, he added.

"Very interesting. Basically a product enhancement" was the reaction of James Upton, executive vice-president of Inco-term, who added he didn't see anything particularly dramatic in the announcement.

Inco-term is in the pseudo batch terminal market in some areas, and "I think we'll see them as effective competition. I don't see it changes dramatically what people will do; they'll just have another element in their decision."

The firm will offer SDLC compatibility "when necessary," he said.

One independent noted that SDLC is definitely part of its plans and added that SDLC could well become the unifying medium in communications.

Sycor has promised its users it will provide SDLC," Paul La Voie, vice-president of marketing, said.

Since only 5% of Sycor's business is related to strictly RJE business, he doesn't see much impact on Sycor's plans.

Consultant Robert Morse of Computer Systems Architects called the announcement an "obvious step toward making SDLC an industry standard. SDLC is an improvement, an advance."

With Decwriter II

DEC Components Group Aims High

LOS ANGELES — Armed with the LA36 Decwriter II, the latest weapon in its OEM arsenal, the Digital Equipment Corp. (DEC) Components Group is out to make the unit "the industry standard" in 30 char./sec printers.

Reception at the Western Electronic Show and Convention (Wescon) was "excellent," according to John Wollaver, product manager. In fact, he added, DEC has already received an order for the printer.

DEC is setting up to produce 50,000 LA36s annually.

The unit, which is being offered as a replacement for the LA30, sells for \$1,850 in single quantities with up to 38% discounts, whereas the LA30 sells for \$2,800 in single units and a 20% discount. In lots of 100, the LA36 sells for \$1,250.

DEC is offering its customers who are on backlog to receive 30s the opportunity to receive the 36.

The 36 was designed with reliability in mind and contains five subsystems, spokesmen said.

Andy Knowles, Components Group vice-president, said the terminal market is projected to be between \$1.5 billion and \$2 billion in 1975, and "if you're going to make any kind of inroad you'd better spend the dollars to go after it."

He noted the Components Group's OEM charter opens up a whole new spectrum for DEC, which in the past has been hesitant to put its terminals on other firms' products.

DEC will provide interfaces needed for the 36, although it comes with the standard 20mA interface and EIA is optional.

DEC's service group will provide services under separate contract if desired.

The company plans four regional warehouse/repair depots by the end of 1976, which will promote prompt delivery of products and provide customers with more localized repair facilities, Knowles said.

In addition to the facility on the East Coast, warehouses are planned in Europe ("probably Holland"), the West Coast and Midwest, Knowles said.

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RAYTHEON Mike Salter, Commercial Marketing Manager, Raytheon Service Company, 12 Second Ave., Burlington, MA 01803. (617) 272-9300.

3M Cartridge the Hit Medium In Wescon Product Offerings

By Molly Upton
Of the CW Staff

LOS ANGELES — Several DP products made their debut at the Western Electronic Show and Convention (Wescon) here recently amid the crowd of electronic gear.

And, in what may be the start of a trend, several exhibitors chose the 3M cartridge cassette as the medium to challenge everything from 7- or 9-track tape to Philips cassette.

Qantex introduced the Model 2400, a "mass storage device" for up to eight cartridges. The unit interfaces with a Digital Equipment Corp. DEC PDP-11/05 or Data General Novas, and the company expects to announce an interface to the Intel 8080 soon.

With eight cartridges, the total capacity of the 2400 is over 23M bytes. Typical access speed is 20 seconds, the company said.

Up to four tracks can be written and read on the tape. A 4-track unit, which includes chassis, formatter and power supply, sells for \$2,650. A four-tape, 4-track unit is priced at \$5,095.

Qantex is directing sales of the 2400 toward both the end-user and OEM markets.

It also markets the Model 600 cartridge drive, which sells for \$748 (1-track) and \$849 (4-track) in single quantities. The 600 measures 3-1/8 in. by 7 in. by 10 in.

Qantex is at 200 Terminal Drive, Plainview, N.Y. 11803.

Redactron Corp. showed its Series 300 cartridge recorder, designed around the 3M cartridge. The 300 is a 4-track device priced at under \$350 in OEM quantities with rewrite and motor control electronics. An MOS chip controlling the drive contributes to the compact design. The complete unit measures 3-3/4 in. by 8-1/2 in. by 6 in.

The 300 uses solid-state LED circuitry for end-of-tape and beginning-of-tape detection.

Redactron is at 100 Parkway Drive S., Hauppauge, N.Y.

Gould, Inc.'s drive for the 3M cartridge is available in either one-, two- or four-track configurations, either serial or parallel. In single quantities, the four-track read-after-write unit sells for \$995. On display at the show was the 2/6400, a dual-drive unit. Gould Instrument Sys-

No Device Ignored In Redactron Line

LOS ANGELES — Covering a wide spectrum of small media storage devices, Redactron Corp. markets drives for the Phillips cassette, the 3M cartridge and two versions of magnetic card readers, one of which is IBM-compatible.

"OEM business was on the upswing last year and looks good this year. I can't really complain," said Redactron's manager of OEM sales, Ted Reantillo.

The mag card transport, which is already well known in the word-processing field, is also expected to be used in test equipment and possibly in the graphic arts, he said.

Redactron makes two models; one reads the IBM-compatible 50-track card that holds 5,000 characters, and the other transport handles a 64-track card that contains 10,240 characters.

There is ample evidence makers of transports for the 3M cartridge are mounting an attack on the market now held by the Philips cassette.

Redactron makes both units, and Reantillo admitted there will be some competition between the cartridge drive and the floppy disk.

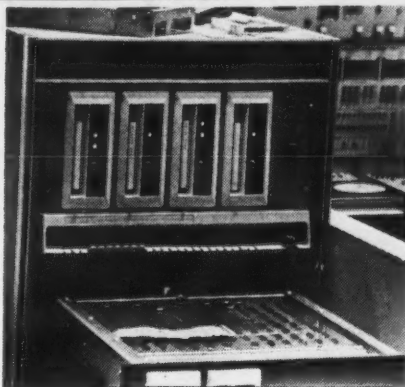
"One will take away from the other, although there are specific applications for each," he said.

tems Division is at 3631 Perkins Ave., Cleveland, Ohio 44114.

Digital Electronics Co. showed its EMS-4 microcomputer system, an Intel 4004-based system that has 2K of read-only memory for an operating system and 1K of programmed instruction random-access memory. The system has both a hexadecimal and command keyboard, permitting stand-alone operation of the system.

The EMS-4 has a TTY interface and buffered output. With the EMS-4 a user can perform such prototyping functions as loading, examining and modifying a memory, saving its contents on tape; selectively executing parts of a program; moving memory contents; and searching under mask.

The unit sells for \$2,000. A programmable read-only memory programming unit, costing \$450, is also available from

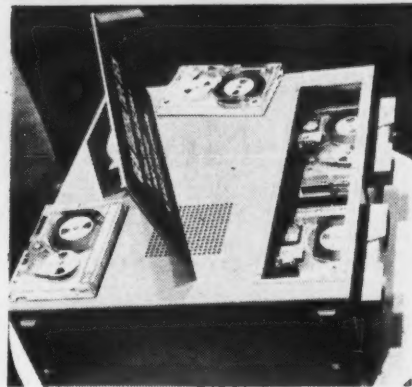


Qantex 4200 3M Cartridge Storage Unit

the firm at 50 Windsor Ave., Kensington, Calif. 94708.

Casio, Inc. is incorporating its quiet Typuter ink-jet printer into a communications terminal with RS-232 interface and modem. The unit, aimed at the OEM market, prints 33 char./sec. and will sell for around \$1,500 in single quantities.

Casio also showed the other versions of its Typuter, which was first unveiled in prototype form at Wescon last year. The 400 KSR and 500 ASR versions were also



Gould Cartridge Drive

on display.

Casio, is at Executive Office Suite 4011, One World Trade Center, New York, N.Y. 10048.

The Votrax speech synthesizer from the Vocal Interface Division of FSW, drew a crowd as it verbalized input received from its specially designed keyboard. The unit accepts digital phoneme commands, and certain keys indicate intonation. The company is at 500 Stephenson Highway, Troy, Mich. 48084.

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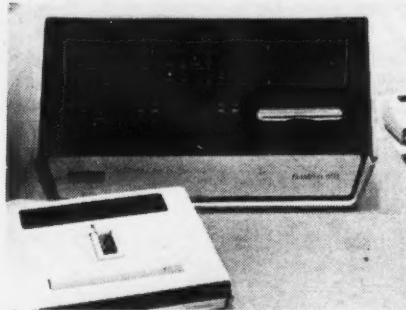
We've established a new standard of excellence in data entry.



Many Products on Wescon Floor Echo Focus on Microprocessors

By Molly Upton
Of the CW Staff

LOS ANGELES — The focus of the professional sessions on microprocessors and circuitry was reflected in the exhibit hall at Wescon by a number of new testers and programming units for programmable read-only memories (Prom) and micro-



Fairchild's Qualifier 901 Tester

processor chips.

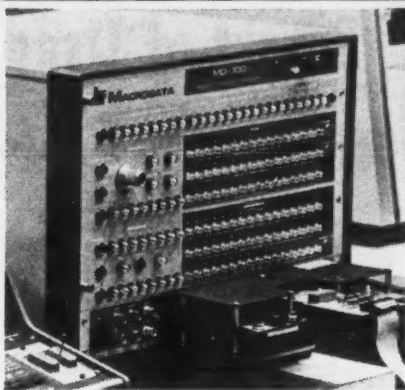
Macrodata Corp. slashed the price on its MD-100 1K or 4K programmable random-access memory (RAM) tester from \$20,000 to \$9,995. The price cut applies through Nov. 30. The unit is programmable through insertion of various personality cards for commercial RAMs.

By linking up the MD-100 with the Data I/O Corp.'s Prom programmer, Macrodata offers one-station, single-insertion programming and functional clock-rate testing of Proms.

After the bit pattern is loaded via paper tape into the MD-100 buffer memory, the Prom is programmed by the Data I/O unit and tested by either Macrodata patterns or customer algorithms.

Testing at programming time saves trying to locate an error at board level, the company said.

The system, including the MD-100, Data I/O programmer and personality cards, is



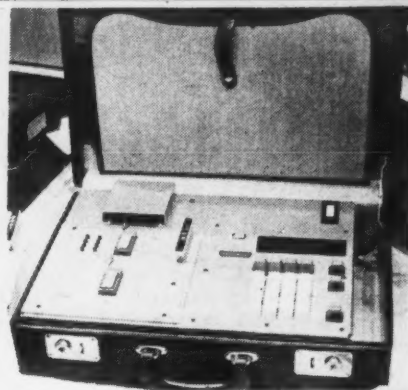
Macrodata MD-100

priced at \$16,000 from 6203 Variel Ave., Woodland Hills, Calif. 91364.

Macrodata also showed its MD-107, a board tester that handles up to 72 memory chips.

Fairchild Quality Assurance Products unveiled its Qualifier-901 tester, which is programmed by inserting a plastic "Qual" card. The 901's optical reader decodes the card. The 901 sells for under \$8,000 for 16-pin capability.

Data I/O Corp. unwrapped its Model 6

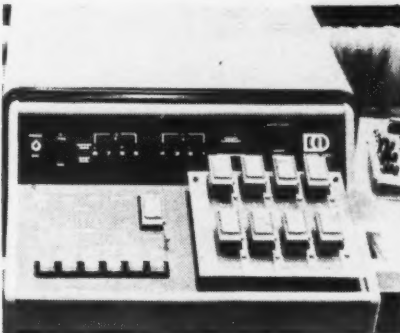


CW Photos by M. Upton

Pro-Log Series 90

gang Prom programmer as a replacement for the Model 4. The unit handles up to 32K onboard, can program up to eight Proms simultaneously and can interleave eight programs, the company said.

The Model 6 costs \$5,600, which includes a personality card, 8-level tape reader and Prom memory module. Per-



Data I/O Model 6 Gang Programmer

sonality cards are interchangeable among various Data I/O units.

The company is at 1297 N.W. Mall, P.O. Box 308, Issaquah, Wash. 98027.

Pro-Log Corp.'s Series 90 Prom programmer incorporates an Intel 4004 chip and can program chips up to 4K 8-bit words. The Series 90, which features a hexadecimal keyboard and six-digit display, comes in a briefcase and weighs less than 18 pounds.

Interfaces are available. The unit sells for about \$1,800.

Pro-Log is at 852 Airport Road, Monterey, Calif.

Emulation Approach To LSI Test Patterns Simpler, Less Costly

LOS ANGELES — The expense and complexity of test pattern generation for LSI devices can be reduced "if the unit is treated as a system composed of instructions" instead of a "black box," said William J. Mandl of Macrodata Corp.

He defined the black box approach as that used by the test engineer who assumes "he knows nothing about the device other than the logic equations for the internal switching nodes" and generates a pattern that will switch all the nodes.

Common Test

An emulation technique "can be used as a common means of test pattern definition between the user and the design engineer," Mandl said.

Emulation of a processor chip can be done either by hardware or software techniques, but there are problems with both. None of the tester manufacturers offers a useful software package for processor emulation and development seems to go on forever because the package would need to be designed to service many of the chips on the market, he said.

The hardware approach is stymied by the lack of a test electronics pattern processor powerful enough to emulate all of the microprocessors now on the market, Mandl said.

However, the processor-controlled MD-104 from Macrodata can generate test patterns for microprocessors in a semialgorithmic manner in real time, which is fast enough, he said.

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Japan Prohibiting Import of Used 360s, Foreign Orders & Installations IBM Said Destroying Them to Protect 370

TOKYO — Despite the increasing liberalization of ownership in computer firms and importation of equipment, the Japanese government is barring the importation of used IBM 360s, according to *EDP Japan Report*.

At the same time, in order to protect the market for 370s, IBM Japan is reportedly destroying 360s returned off rent, the newsletter said.

The Ministry of International Trade and Industry (MITI) last year denied Greyhound and Leasco's plan to market 360s in Japan. The agency also turned down an application from Nip-

pon Computer, a third-party lessor, to import 360s.

MITI is also said to be investigating tariff laws in an effort to make the 360 less desirable than native machines, in anticipation of total relaxation of controls.

The agency is looking for ways to invoke emergency tariffs and/or impose import duties on immigrant 360s, the report said.

In addition, MITI plans to recommend to the Ministry of Finance that special tax breaks be given to users of native com-

puters.

The number of domestic systems being returned is expected to increase sharply as Japanese manufacturers start shipping their new models.

About 40% of native machines valued at more than \$33,000 are rented through the Japan Electronic Computer Co. (JECC), which buys them from the mainframers. But mainframers must buy these rented machines back at residual value if they're returned before fully depreciated.

Organizacion Sindical, the Spanish Trade Unions Organization, has ordered two Univac 1106s for accounting, unemployment control and the preparation of econometric models.

New Basingstoke District Hospital, England, has installed a Modular One computer from Computer Technology Ltd. to handle hospital information and administrative applications.

Leicester Polytechnic, England, has ordered a Burroughs B6700 to be the heart of a terminal network serving classroom and administrative functions.

Shell Francaise, Paris, has ordered a Univac 1110 for linear programming, statistical work, simulations and calculations, including a Pert system for the maintenance of refineries, inventory control, billing and payroll processing.

State Services Commission, Wellington, New Zealand, has ordered a Burroughs B4700 system to provide DP services to various government departments. The B4700 will also be hooked to a B3500 30 miles away which controls a nationwide network of computer terminals.

Two Firms Up Prices

TOKYO — Control Data Corp. Japan and Nippon Univac Kaisha Ltd. (NUK) have announced price hikes following increases from IBM (CW, July 24).

Rising labor and materials costs are credited for the 10% price increase recently announced by CDC Japan.

The increase affects only CDC 1700, SC1700 and System 17 machines, a company spokesman said, and only new users.

The increases, which became effective Aug. 1, apply to both leased and purchased equipment. Maintenance prices on purchased equipment also were increased.

Nippon Univac Kaisha Ltd. (NUK), a joint venture of Sperry Rand Corp., Oki Electric Co. and Mitsubishi Electric Co., has announced an across-the-board price increase on both leased and purchased equipment marketed in Japan.

The increase is 5% to 15% depending on the model and configuration.

Maintenance service costs were also increased 20% to 25% for purchased equipment.

The increases were effective Aug. 1 for new orders and will take effect on Feb. 1, 1975 for existing installations.

The new GTE Information Systems' IS/7800 Series Intelligent Video Terminals cost an average of 15-39% less than IBM 3270's on one-year rental, and 33-43% less on three- and five-year rentals. Buy them outright, and save 40-50%.

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From SDS to the CP-V

Xerox Gets Return on Old Investment

By Molly Upton
Of the CW Staff

EL SEGUNDO, Calif. — The Xerox takeover and capital infusion of the old Scientific Data Systems (SDS) have begun to bear fruit in the form of the 550 and 560 and the CP-V operating system, according to Jack C. Lewis, vice-president of computer marketing.

With the firm's admittedly recent realization of its technical software strength, Xerox is now plotting a determined path to become the second vendor in

installations where there's a need to more efficiently perform communication processing and interactive DP, Lewis revealed.

"We concluded we've done a poor job of marketing our product differentiation, the operating system," added Mike Harvey, manager of systems marketing business centers.

Rather than offer an extensive line of specific software packages, Xerox is developing a flexible tool to allow users to tailor the system to their needs, he said.

In the last year, throughput of CP-V has been improved about 30%, Lewis added to emphasize the firm's software commitment.

Building on the technical base that led SDS and then Xerox Data Systems to be known for its time-sharing abilities, the CP-V features data base commonality, with various languages common to any mode of operation, explained Bob Donaldson, manager of computer products business centers.

Xerox is emphasizing the term "interactive processing" rather



Harvey



Lewis

CW Photos by M Upton

than time-sharing as the latter connotes usage by engineering types rather than performance of business DP-type jobs, Lewis explained.

Mail Campaign

The target market is the For-

tune 1300 and large educational institutions. The medium is direct mail to top executives, which explains in somewhat technical terms the strengths of the Xerox family of computers.

In tandem with the mailing is an advertising campaign in the trade press to inform DP managers. In addition Xerox sponsors traveling seminars about its products.

Especially in the last 18 months, the firm has stepped up its sales to end users, Harvey noted. The four markets are divided into the categories of education, communications, engineering-scientific and multiuse.

Harvey said the firm is well ahead in its quota in all four areas over last year.

In addition, Xerox has found that its OEM sales, which are principally to firms supplying the large utilities, are opening up sales to end users.

Xerox is aiming to become "the second vendor" because it is very difficult to get a user to replace his vendor, Lewis said.

But users considering upgrading their current systems can be shown how adding a Xerox 550 or 560 and perhaps even downgrading the current CPU can result in increased throughput at a savings.

The Xerox unit handles the communications and can take peak loads off the other machine, leaving it free for batch work. Or the Xerox can become a front end to the other machine, Lewis said.

Xerox will maintain a continuation of its product line, perhaps including a multiprocessor version of the Sigma 9. The firm has no plans for a mini, Lewis said.

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CCDs Challenging Disks, Drums

By Molly Upton
Of the CW Staff

LOS ANGELES — Rotating mass memories will find a cost-competitive all-electronic counterpart in charge-coupled device (CCD) memories, a Wescon session on advances in CCD memories was told.

J.M. Chambers and D.J. Sauer of RCA, Van Nuys, Calif., and W.F. Kosonocky of the David Sarnoff Research Center explained their work on a 16K CCD memory chip and compared typical characteristics of a drum with those expected for an equivalent CCD memory.

For an 8.4M bit memory, the CCD unit's access time is expected to average 2 msec; the drum averages 10 msec. The CCD unit is one-third cubic foot, instead of three cubic feet, and uses only 5 Watts operating with

2 Watts standby, compared with 300 Watts for the drum.

In addition, mean time between the failure is projected to be 20,000 hours, compared with 3,500 for the drum.

The RCA team explained that although CCDs are volatile, batteries can supply data retention capability because of the unit's low power consumption.

Second Function

In addition to replacement of rotating memories, another likely early application for CCDs is in sub-msec access times.

The units can also fill the bill of a "truly practical memory" in the 0.1M- to 1.0M-bit range and are likely to be used in micro-processor systems that require extended memory.

But, they noted, "the sole, overwhelming consideration

which will determine the long-range success or failure of CCD memories is their cost, "since their access time is generally slower than that of other forms of all-electronic memory.

The scientists predicted that the cost of CCDs can reach half that of MOS RAMs, their closest competition cost-wise, and a price of one fifth that of the RAMs is "a challenging goal."

There's a strong possibility that CCDs will evolve both toward an absolute minimum cost and as a compromise between cost and performance, they said. The former would incorporate high bit density per chip, uncomplicated clocking and result in long loops and slow access time. Faster access time would mean shorter loops, more clocking and thus more power requirement and system cost.

Contracts

NCR POS to Use Spectra-Physics Lasers

MOUNTAIN VIEW, Calif. — Spectra-Physics has received a \$9.8 million order from NCR for laser scanning equipment to be used in its 255 supermarket point-of-sale system.

The scanners will be mounted in the checkout counter. A complete NCR 255 system is currently under test at a Marsh Supermarket in Troy, Ohio.

Other Contracts

A contract in excess of \$3 million for 64K-word by 60-bit and 131K-word by 60-bit memories has been awarded to Data-products Corp. by Burroughs Corp.

The Environmental Protection Agency has renewed its contract for DP services with Optimum

Systems, Inc. for fiscal 1974-75. The original contract, issued in 1973, was for \$12.8 million, but could now run as high as \$38.4 million, according to William R. Roach, executive vice-president.

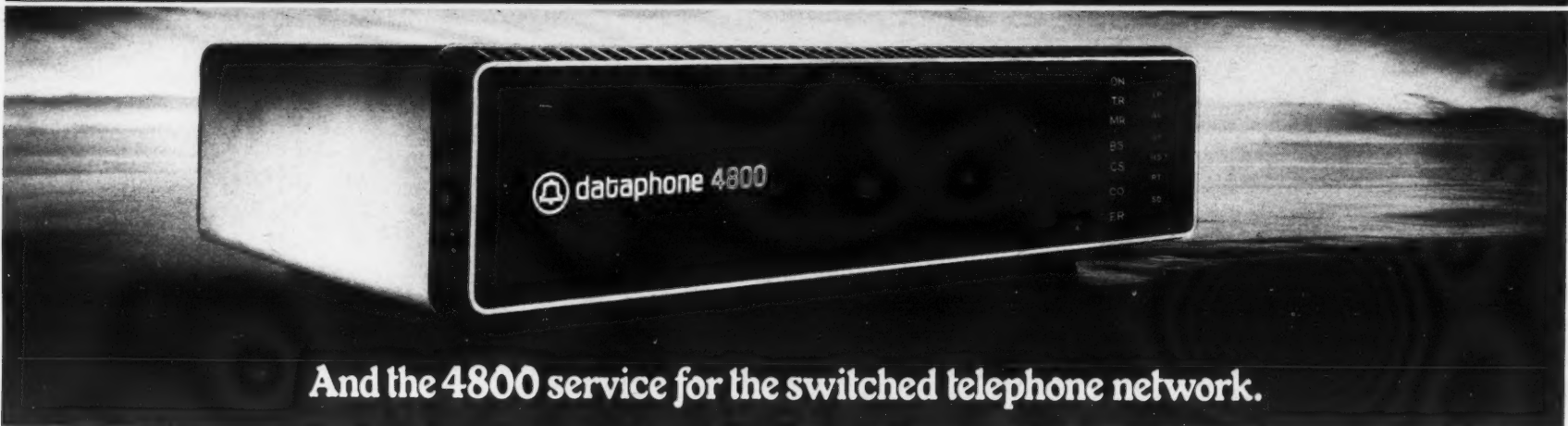
The State of Maine has signed a \$4.5 million contract with Bergen Brunswick Corp. for its health applications systems, which will be performing administrative functions for the state's Medicaid prescription drug program.

Calspan Corp. has signed a seven-year agreement authorizing Martin Marietta Data Systems to assume immediate operation of its IBM 370/168 center near Buffalo, N.Y. The computer facility, formerly owned by Cornell Aeronautical Laboratory, will be called the Great Lakes Data Center.

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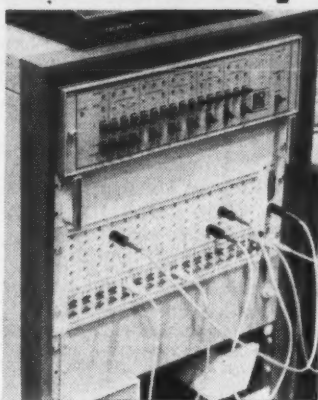
IDS Mini 'Enters' Quietly

LOS ANGELES — In what must be called a low-key non-introduction to its first appearance in a major show, the International Digital System, Inc. IDS-16 minicomputers helped lend some atmosphere to another company's booth at Wescon recently.

The young mini company is currently marketing its Nova-compatible product in Orange County, Calif., according to its president, Gary Greenwood.

Cobol Compiler

The unit is a 16-bit mini that the company says can directly address up to 65K. It also features hardware breakpoint and is frontloading. The company offers a Cobol compiler for the mini and pricing is about the same as for a Data General Corp. Nova, Greenwood said.



CW Photo by M. Upton

International Digital Systems IDS 16 Mini.

International Digital also supplies a one-board controller for Century Data Corp.'s new Trident disk system.

The firm is at 17951 Sky Park Circle, Irvine, Calif. 92707.

Earnings Reports

GRAPHIC CONTROLS

Three Months Ended June 30

	1974	1973
Shr Ernd	\$.51	\$.41
Revenue	9,930,620	7,496,289
Earnings	418,503	335,144
6 Mo Shr	1.06	.82
Revenue	19,150,782	14,834,574
Earnings	875,424	680,197

a-Restated.

DATA-CONTROL SYSTEMS

Three Months Ended June 30

	1974	1973
Shr Ernd	\$.07	\$.07
Revenue	\$2,053,000	1,511,000
Tax Cred	24,000	24,000
Earnings	(111,000)	64,000
9 Mo Rev	4,923,000	3,674,000
Loss	146,000	220,000

DATA-DESIGN LABORATORIES

Year Ended June 30

	1974	1973
Shr Ernd	\$.70	\$.54
Revenue	16,400,000	12,553,000
Tax Cred	45,000	45,000
Earnings	775,000	597,000

DATA DISC

Three Months Ended June 28

	1974	1973
Shr Ernd	\$.02	\$.19
Revenue	2,564,383	2,596,917
Earnings	19,812	196,194
6 Mo Shr	.19	.37
Revenue	4,949,373	5,136,752
Earnings	195,174	386,306

DATATROL

Year Ended April 30

	1974	1973
Shr Ernd	\$.51	\$.51
Revenue	\$3,063,997	3,265,161
Spec Cred	233,500	233,500
Earnings	a(2,260,137)	495,105

a-Includes a software write-down.

GRAPHIC SCIENCES

Year Ended June 30

	1974	1973
Shr Ernd	\$.35	\$.33
aRevenue	14,772,000	10,434,000
Disc Op	25,000	290,000
Tax Cred	328,000	365,000
Earnings	1,049,000	1,006,000
3 Mo Shr	.13	.07
aRevenue	4,021,000	3,211,000
Tax Cred	108,000	86,000
Earnings	386,000	213,000

a-From continuing operations.

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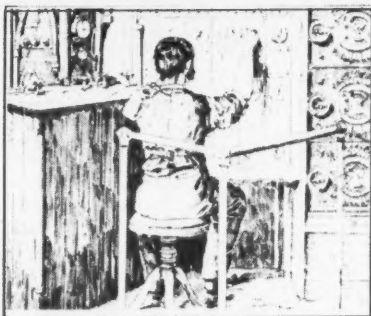
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OMNITEC CORPORATION2405 S. 20th Street
Phoenix, Arizona 85034
(602) 258-8244**Calcomp's Revenues Rise 62% in Year**

ANAHEIM, Calif. — California Computer Products, Inc. (Calcomp) put together four successively improved fiscal quarters and came up with record sales and earnings for the year ended June 30.

Revenues rose 62% to \$129.9 million compared with \$80.3 million in the 1973 period.

Earnings, including a \$3.3 million tax credit, totaled \$8.7 million or \$2.84 a share compared with \$465,000 or 16 cents a share last year.

All segments of the business were up, a company spokesman said, even the COM business.

The company had a record third quarter, at which point its revenues were \$10 million ahead of last year.

President Lester L. Kilpatrick said he is enthusiastic about Calcomp's prospects for continued growth and expects fiscal 1975 revenues to exceed those of fiscal 1974.

The company has grown an

average of 38% annually compounded over the last 10 years, the spokesman added, observing there are fewer prosperous large peripherals firms offering a broad range of products than there used to be.

Computer Automation Logs Records In 1974 Earnings, Revenue Jumps

IRVINE, Calif. — Computer Automation, Inc., maker of the Naked Mini, saw its 1974 sales rise 74% and earnings jump 88% over the 1973 figures.

Earnings for the year were a record \$1.9 million or \$1.13 a share compared with \$1.2 million or 75 cents a share in 1973, when there was a tax credit of

\$187,000.

Revenues totaled \$19.7 million compared with \$11.3 million last year.

For the quarter, which marked the firm's 12th consecutive quarter of increased sales and earnings, revenues rose to \$5.9 million from \$3.4 million in the year-ago period.

The three-month earnings jumped to \$555,000 or 33 cents a share compared with \$339,000 or 21 cents a share in the 1973 quarter.

"The rising costs of labor and efforts to expand manufacturing capacity in many areas have created an enormous need for minicomputers and related products in all business sectors," President David H. Methvin said.

Computer Automation shipped more than 3,500 computers during the year and as of Aug. 16 had a backlog over \$12 million, about half of which is accounted for by sales of the LSI family of computers, he said.

Anderson Jacobson Sees Earnings Climb 36%

SUNNYVALE, Calif. — Anderson Jacobson, Inc. (AJ) continued its trend of increased earnings and revenues, with earnings rising 36% for the year ended March 31.

Revenues from lease and services, which comprise 81% of total revenues, jumped 66% to nearly \$7 million from \$4.2 million a year ago.

Total revenues rose 47% to \$8.6 million from \$5.9 million a year ago.

Earnings jumped to \$475,095 or 19 cents a share compared with \$375,026 or 15 cents a share, including a \$35,746 credit from the sale of land.

Revised Agreements with Creditors Give Memorex 'Breathing Room'

SANTA CLARA, Calif. — Memorex Corp. has obtained some "breathing room" with its senior creditors through the establishment of revised agreements in the works since March.

The creditors are the Bank of America and creditors of ILC Peripherals Leasing Corp., a wholly owned subsidiary.

"These arrangements result in an improvement in Memorex's total preferred and common shareholders' equity of \$69.4 million. As of June 30, 1974 Memorex reported a deficit shareholders' equity of \$92.2 million.

"The arrangements further provide for substantial improvements in Memorex's cash flow,"

said President Robert C. Wilson.

Among the short-term benefits are a reduction in interest expenses on senior debt which amounts to \$22.3 million and a reduction of principal payments from \$3 million/mo to \$2.25 million/mo.

Long-term benefits include extension of a new \$35 million line of credit from the Bank of America to become available as existing bank loans are reduced at a rate of \$750,000/mo and future conversion of \$25 million in senior debt to preferred stock, if requested by Memorex.

Also, all interest paid on remaining senior debt through Dec. 31, 1977 may be paid with preferred stock.

Graham Magnetics' Year Results Show Continued Profit, Growth

GRAHAM, Texas — Graham Magnetics, Inc.'s revenues and earnings set records for the year ended June 30, scoring results more than 30% above the previous year.

Earnings rose to \$1.3 million or \$1.40 a share from \$986,129 or \$1.06 a share last year while revenues topped \$15 million, compared with \$11.4 million last year.

The 1974 results mark the fifth consecutive year of operating profit and eighth year of substantial sales growth, according to G.A. Jagers, president.

Sales in 1975 will be influenced by several new products

introduced in 1974, including severe-environment tapes for audio, digital and instrumentation applications, a flexible magnetic disk, a magnetic card for word processing and an advanced digital computer tape, Jagers said. Another new product will be announced soon, he added.

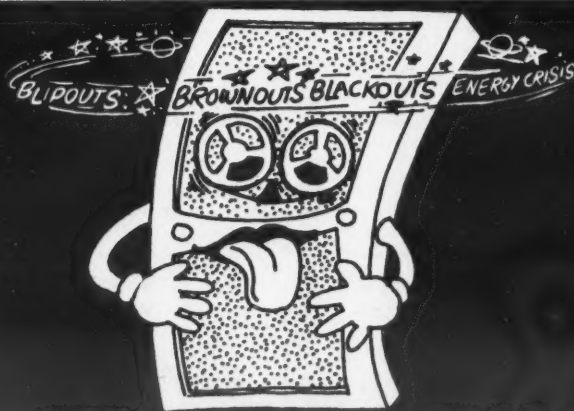
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Revenue	\$6,479,000	Revenue	13,675,000
Disc Op	(129,000)	Earnings	308,000
Tax Cred	1,154,000	6 Mo Shr	.17
Earnings	(821,000)	Revenue	26,469,000
6 Mo Shr	1.80	Earnings	746,000
Revenue	11,731,000	Revenue	21,345,000
Disc Op	(86,000)	Earnings	1,248,000
Tax Cred	2,203,000	a-Includes results of Bresnahan Com-	
Earnings	(1,183,000)	puter Corp., EDP Resources, Inc.,	
		Traleascorp, Inc. and D.S., Inc. from	
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a-Restated to reflect discontinued operations. b-Losses from operations to

be discontinued have been deferred pending disposition.

HEWLETT-PACKARD	
Three Months Ended July 31	
1974	1973
Shr Ernd	\$.84
Revenue	233,582,000
Earnings	22,995,000
9 Mo Shr	2.14
Revenue	639,173,000
Earnings	57,992,000

INTERDATA	
Three Months Ended June 28	
1974	1973
Shr Ernd	\$.23
Revenue	7,366,900
aSpec Cred	32,100
Earnings	486,200
6 Mo Shr	.45
Revenue	14,024,200
aSpec Cred	56,500
Earnings	956,500

a-Applicable to foreign tax credits of loss carryforward.

MCDONNELL DOUGLAS	
Three Months Ended June 30	
1974	1973
Shr Ernd	\$.95
Revenue	947,663
Earnings	37,040
6 Mo Shr	1.71
Revenue	1,785,685
Earnings	66,504

a-On a fully diluted basis.

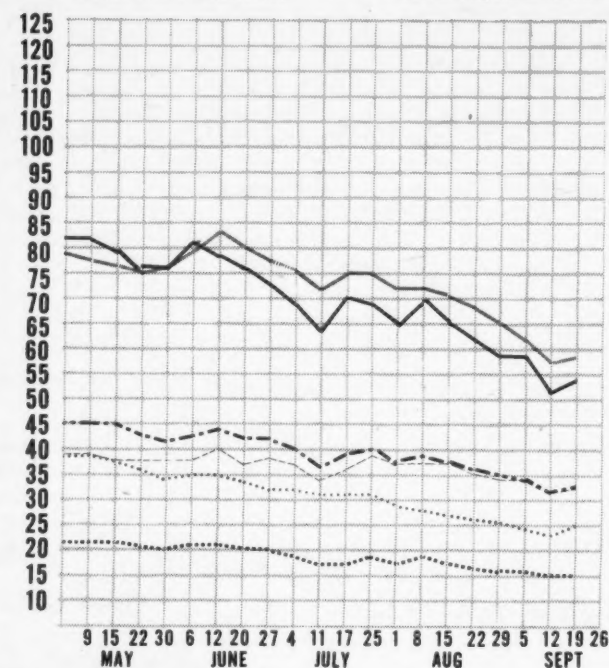
MTS SYSTEMS	
Three Months Ended June 30	
1974	1973
Shr Ernd	\$.33
Revenue	4,966,800
Earnings	253,800
9 Mo Shr	.82
Revenue	13,096,000
Earnings	629,700

NATIONAL SYSTEMS	
Three Months Ended June 30	
1974	1973
Shr Ernd	\$.09
Revenue	2,181,000
Disc Op	(131,000)
Tax Cred	65,000
Earnings	131,000
6 Mo Shr	.13
Revenue	4,411,000
Disc Op	(48,000)
Tax Cred	98,000
Earnings	196,000

a-Restated.

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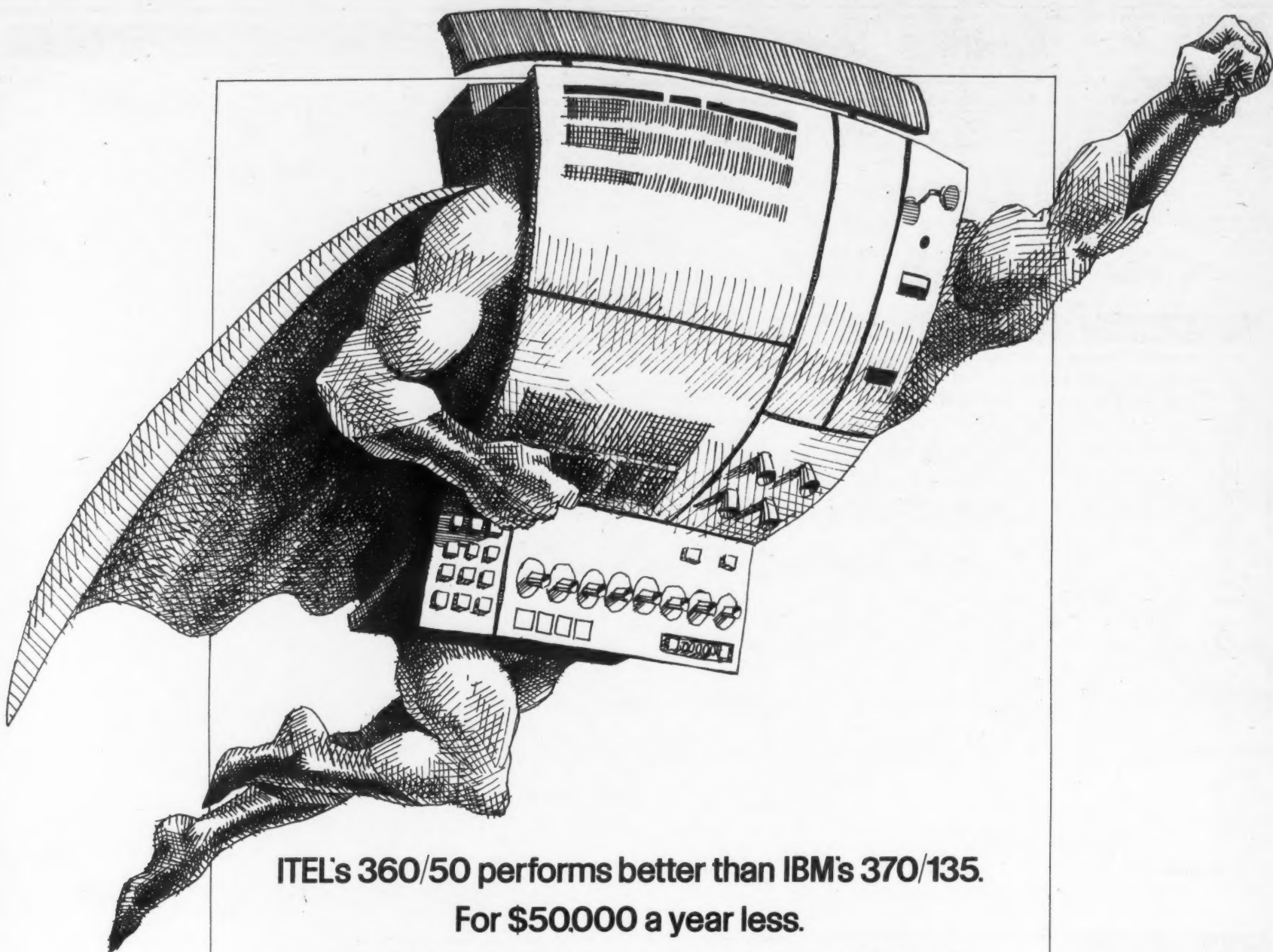
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Computerworld Stock Trading Summary

All statistics compiled,
computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

PRICE					PRICE					PRICE											
1974	CLOSE	WEEK	WEEK		1974	CLOSE	WEEK	WEEK		1974	CLOSE	WEEK	WEEK								
RANGE	SEP 19	NET	PCT		RANGE	SEP 19	NET	PCT		RANGE	SEP 19	NET	PCT								
(1)	1974	CHNGE	CHNGE		(1)	1974	CHNGE	CHNGE		(1)	1974	CHNGE	CHNGE								
COMPUTER SYSTEMS																					
N	BURROUGHS CORP	73-217	77 1/8	+4 1/8	+5.6	O	ADVANCED COMP TECH	1- 2	1 1/2	+ 1/4	+33.3	O	COMPUTER COMMUN.	1- 2	1 1/2	0	0.0				
N	COMPUTER AUTOMATION	8- 14	8 1/4	+ 1/4	+3.1	A	APPLIED DATA RES.	2- 3	1 1/2	- 1/8	-7.6	A	COMPUTER EQUIPMENT	1- 2	1 1/4	0	0.0				
N	CONTROL DATA CORP	13- 38	16	+2 1/2	+18.5	O	APPLIFD LOGIC	1- 1	1/8	0	0.0	O	COMPUTER MACHINERY	2- 5	2 1/8	0	0.0				
N	DATA GENERAL CORP	16- 38	18 1/4	+ 7/8	+5.0	N	AUTOMATIC DATA PROC	21- 57	24 1/2	+2	+8.8	O	COMPUTER TRANSCETIVER	1- 2	3/4	0	0.0				
O	DATAPoint CORP	8- 15	8 1/2	+ 1/4	+3.0	O	BRANSON APPLIED SYST	1- 1	1/4	0	0.0	N	CONRAC CORP	10- 22	11 1/4	- 3/8	-3.2				
O	DIGITAL COMP CONTROL	2- 5	2 1/8	0	0.0	O	CENTRAL DATA SYSTEMS	4- 6	3	0	0.0	O	DATA ACCESS SYSTEMS	2- 3	2 1/2	0	0.0				
N	DIGITAL EQUIPMENT	73-121	75 1/2	+1 1/8	+1.5	O	COMPUTER DIMENSIONS	2- 3	1 1/2	0	0.0	O	DATA 100	6- 13	6 1/4	+ 1/2	+8.6				
N	ELECTRONIC ASSOC.	2- 3	1 5/8	- 1/8	-7.1	O	COMPUTER HORIZONS	1- 5	1 1/4	0	0.0	A	DATA PRODUCTS CORP	3- 4	2 7/8	0	0.0				
A	ELECTRONIC ENGINEER.	5- 11	5 3/4	+ 1/2	+9.5	O	COMPUTER NETWORK	1- 2	1 1/8	0	0.0	O	DATA RECOGNITION	1- 1	1/4	0	0.0				
N	FOXROD	21- 48	22	- 7/8	-3.8	N	COMPUTER SCIENCES	2- 4	2 1/8	+ 1/8	+6.2	O	DATA TECHNOLOGY	2- 4	2 3/8	0	0.0				
O	GENERAL AUTOMATION	20- 40	21 1/4	-1 3/4	-7.6	O	COMPUTER TASK GROUP	1- 1	3/4	0	0.0	O	DECISION DATA CO/PUT	3- 13	3 1/2	+ 5/8	+21.7				
O	GRI COMPUTER CORP	1- 2	1/2	0	0.0	O	COMPUTER TECHNOLOGY	1- 1	1/2	0	0.0	O	DELTA DATA SYSTEMS	1- 2	3/4	0	0.0				
N	HEWLETT-PACKARD CO	62- 90	65 5/8	+2 1/8	+3.3	O	COMPUTER USAGE	2- 4	2 1/4	0	0.0	O	DI/AN CONTROLS	1- 2	5/8	0	0.0				
N	HONEYWELL INC	28- 86	31 7/8	+1 1/2	+4.9	O	COMRESS	1- 1	1/4	+ 1/8	+100.0	N	ELECTRONIC M & M	2- 4	1 3/4	0	0.0				
N	IBM	152-251	170 1/2	+14	+8.9	O	COMSHARE	2- 4	1 7/8	0	0.0	N	FARRI-TEK	1- 3	1 3/8	+ 3/8	+37.5				
O	INTERDATA INC	8- 22	14 1/4	+ 1/2	+3.6	N	CORDURA CORP	2- 4	1 1/2	- 1/8	-7.6	O	GENERAL COMPUTER SYS	1- 4	1 1/4	- 1/2	-28.5				
O	MICRONDATA CORP	2- 5	2 1/2	+ 1/8	+5.2	O	DATABAS	1- 3	1	0	0.0	N	GENERAL ELECTRIC	30- 85	37 3/8	+6 3/8	+20.5				
N	NCR	19- 40	22 1/4	+3	+15.5	A	ELECT COMP PROG	1- 1	1/8	0	0.0	N	HAZELTINE CORP	3- 7	3	+ 1/8	+4.3				
N	RAYTHEON CO	22- 39	22 1/2	-1 1/8	-4.7	N	ELECTRONIC DATA SYS.	12- 25	14 1/2	+1 7/8	+14.8	O	INFORFX INC	2- 5	2 7/8	- 1/4	-8.0				
N	SINGER CO	15- 40	15 1/4	0	0.0	O	INFONATIONAL INC	1- 2	1/2	0	0.0	O	INFORMATION DISPLAYS	1- 1	1/8	0	0.0				
N	SPERRY RAND	24- 44	27 3/8	+2 5/8	+10.6	O	I.O.A. DATA CORP	1- 1	1/4	0	0.0	O	INFORMATION INTL INC	7- 14	7 1/4	- 3/4	-9.3				
A	SYSTEMS ENG. LABS	1- 3	1 1/2	+ 1/4	+20.0	O	IPS COMPUTER MARKET.	1- 1	3/4	0	0.0	A	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0				
N	TEXAS INSTRUMENTS	64-115	67	-1 7/8	-2.7	O	KEANE ASSOCIATES	2- 4	1 3/4	0	0.0	O	MANAGEMENT ASSIST	1- 1	1/8	0	0.0				
O	ULTIMACC SYSTEMS INC	1- 2	1	- 1/2	-33.3	O	KEYDATA CORP	1- 6	1 1/2	- 1/8	-7.6	N	MEMOREX	2- 5	2	- 3/4	-27.2				
N	VARIAN ASSOCIATES	6- 13	6 3/4	+ 7/8	+14.8	O	LOGICON	2- 5	2 1/2	- 1/2	-16.6	A	MILGO ELECTRONICS	6- 18	7	- 1/8	-1.7				
N	WANG LABS.	7- 20	8 7/8	+ 5/8	+7.5	A	MANAGEMENT DATA	1- 2	1 1/4	+ 1/8	+11.1	N	MOHAWK DATA SCI	1- 4	1 1/2	0	0.0				
N	XFROX CORP	73-127	78 3/4	+3	+3.9	O	NATIONAL CSS INC	10- 37	12	-2 1/2	-17.2	O	ODEC COMPUTER SYST.	1- 3	1	0	0.0				
LEASING COMPANIES																					
O	BRESNAHAN COMP.	2- 2	2 1/8	0	0.0	O	NATIONAL COMPUTER CO	1- 1	1/4	0	0.0	O	OPTICAL SCANNING	3- 6	3 1/2	0	0.0				
O	COMDISCO INC	1- 7	1	+ 1/8	+14.2	A	ON LINE SYSTEMS INC	21- 30	18 1/4	-1 1/2	-7.5	O	PERTEC CORP	2- 6	2 3/8	+ 1/4	+11.7				
A	COMMERCE GROUP CORP	3- 6	2 7/8	+ 1/8	+4.5	N	PLANNING RESEARCH	2- 3	2 1/4	0	0.0	A	POTTER INSTRUMENT	2- 5	1 5/8	- 1/4	-13.3				
O	COMPUTER EXCHANGE	1- 1	1/8	0	0.0	O	PROGRAMMING & SYS	1- 1	5/8	- 1/8	-16.6	O	PRECISION INST.	1- 3	3/4	0	0.0				
A	COMPUTER INVSTRS GRP	1- 4	3/4	- 1/8	-14.2	O	RAPIDATA INC	1- 5	1 1/4	+ 1/8	+11.1	O	QUANTOR CORP	2- 8	2 1/4	- 1/4	-10.0				
O	COMP. INSTALLATIONS	1- 1	1/4	0	0.0	O	SCIENTIFIC COMPUTERS	1- 1	5/8	0	0.0	O	RECOGNITION EQUIP	2- 5	2 1/4	+ 5/8	+38.4				
M	DATRONIC RENTAL	1- 1	7/8	+ 1/8	+16.6	O	SIMPLICITY COMPUTER	1- 1	3/4	0	0.0	N	SANDERS ASSOCIATES	2- 8	2 1/4	+ 1/4	+12.5				
A	DCL INC	0- 1	3/8	0	0.0	O	TCC INC	1- 1	1/4	- 1/8	-33.3	O	SCAN DATA	1- 2	1 1/8	0	0.0				
N	DPF INC	2- 5	2 1/2	0	0.0	O	TYMSHARE INC	7- 12	7	- 3/8	-5.0	O	STORAGE TECHNOLOGY	7- 15	8 1/4	+ 1/2	+6.4				
O	EDP RESOURCES	2- 3	3 1/4	0	0.0	O	UNITED DATA CENTER	2- 4	2	- 1/2	-20.0	O	SYCOR INC	4- 13	5 1/4	+ 3/4	+16.6				
A	GRANITE MGT	1- 3	1	0	0.0	A	URS SYSTEMS	2- 4	1 7/8	+ 1/4	+15.3	O	TALLY CORP.	2- 4	2 3/8	0	0.0				
A	GREYHOUND COMPUTER	2- 6	2 3/4	+ 5/8	+29.4	N	WYLY CORP	2- 5	2 1/8	+ 1/8	+6.2	O	TEC INC	2- 7	2	0	0.0				
A	ITEL	3- 6	3	+ 1/8	+4.3											N	TEKTRONIX INC	22- 48	23 3/4	+ 1/8	+0.5
N	LEASCO CORP	5- 12	8 1/8	+ 5/8	+8.3											N	TFLEX	3- 4	3 1/2	+ 7/8	+33.3
O	LEASPCORP	1- 2	5/8	0	0.0											O	WANGCO INC	6- 13	5 3/4	- 1/4	-4.1
O	LECTRO MGT INC	1- 1	1/8	0	0.0											O	WILTER INC	2- 8	2 1/4	- 1/2	-18.1
O	NRG INC	1- 5	2 5/8	+1 1/4	+90.9											SUPPLIES & ACCESSORIES					
A	PIONEER TEX CORP	2- 10	2 3/8	- 1/8	-5.0											O	BALTIMORE BUS FORMS	4- 6	4 1/4	0	0.0
A	ROCKWOOD COMPUTER	1- 1	5/8	0	0.0											A	BARRY WRIGHT	4- 7	4 1/8	+ 1/8	+3.1
N	U.S. LEASING	5- 24	6 7/8	+ 5/8	+10.0											O	CYBERMATICS INC	1- 2	5/8	- 1/8	-16.6
EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH															O	DATA DOCUMENTS	23- 54	31 1/2	-1 1/4	-3.8	
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER															O	DUPLEX PRODUCTS INC	6- 17	13 5/8	+ 3/8	+2.8	
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID															N	ENNIS BUS. FORMS	4- 7	4 3/4	+ 1/8	+2.7	
(1) TO NEAREST DOLLAR															O	GRAHAM MAGNETICS	6- 11	6 1/2	+ 1/2	+8.3	
															O	GRAPHIC CONTROLS	6- 11	6 1/4	- 1/2	-7.4	
															N	3M COMPANY	52- 79	55 1/2	+ 3/8	+0.6	
															O	MOORE COMP LTD	40- 57	41 1/4	+1 1/4	+3.1	
															N	NASHUA CORP	24- 45	25 3/4	+1 1/4	+5.1	
															O	REYNOLDS & REYNOLD	8- 35	9 1/2	+1	+11.7	
															O	STANDARD REGISTER	10- 16	10 3/4	+ 3/4	+7.5	
															O	TAR PRODUCTS CO	5- 11	4 3/4	0	0.0	
															N	UARCO	15- 23	16 1/4	+ 7/8	+5.6	
															A	WABASH MAGNETICS	3- 7	3 1/2	- 1/2	-12.5	
															N	WALLACE BUS FORMS	14- 24	16 7/8	0	0.0	



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